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ADDITIONS TO A CATALOGUE OF THE VASCULAR PLANTS
OF THE PEACE AND UPPER LIARD RIVER REGIONS

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INTRODUCTION

IN 1934, the writer published a catalogue of the vascular flora of the Peace and Upper Liard River regions of northwestern Canada.¹ The material upon which the catalogue was based consisted principally of collections made during the field season of 1932 by Dr. E. C. Abbe and the writer on a journey to the Mt. Selwyn district. The route followed the railroad from Edmonton, Alberta, to Dawson Creek, B. C., and the Peace River up to the mountains. In the latter part of that season, a trip was made down the full length of the Peace River to Lake Athabaska, and the material collected along the Peace at Carcajou Settlement and above was also included. In addition to these personal collections, such specimens were cited as the writer had access to in the herbaria at Harvard, the New York Botanical Garden, the National Museum of Canada, and the Philadelphia Academy of Sciences, together with a few from the University of Alberta and from Cornell University.

It was clearly understood at the time that this catalogue was little more than an effort to bring together in one place such botanical knowledge of the region as was available, forming a working list for future investigations. The catalogue itself gave evidence of rather serious gaps which would have to be filled before anything approaching a complete floristic treatment could be made. It was noted² that such common or even weedlike forms as *Eleocharis acicularis*, *Juncus bufonius*, *Typha latifolia*, and *Plantago major* were given but limited ranges by the known records. Likewise, it was evident that aquatic floras had never been collected with any degree of thoroughness, and this still appears to be the case. Furthermore, the Upper Peace River region contains a group of young but highly developed agricultural communities in which an abundance of naturalized weeds might be

¹Contributions from the Arnold Arboretum, Harvard University 6: 1-230, 9 plates, 1 map.

²l. c. p. 7.

expected, but the necessities of the journey of 1932 precluded the possibility of doing justice to this phase of the problem. Consequently, most of the weed flora is absent from the original catalogue.

Additional specimen material has been accumulating steadily since 1934, and most of it has passed through the writer's hands. The original catalogue contained authentic records of 784 species, varieties, and forms, and the list of additions contains no less than 243, bringing the total for the known flora of the region to 1027 species, varieties and forms. Anyone familiar with the progress of botanical collecting in the North will realize that this is still only a working list, for the territory is vast and the regions that have been sampled are only a small fraction of it.

Although the new records have come from a variety of sources which will be noted in detail below, the principal collections are three. The largest number of new records comes from the studies of introduced weeds or "weedy" native plants made by Mr. Herbert Groh, of the Central Experimental Farm at Ottawa. The other large sources are in the collections of Mrs. Mary G. Henry, made during her journey across northern British Columbia in the summer of 1935, and in those of Dr. E. H. Moss, made in the field season of 1941.

In addition to the records of species new to the region, there have been included in the following list a few (32) range extensions. Most of the more recently collected specimens of course make minor extensions of range, but only those have been included which involve large areas of the region as a whole. That is, if a species was previously known only in the plains east of the mountains, but is now known in the latter, or vice versa, these facts have been noted. If a species was previously known by one record, and has subsequently proved to be common and wide-spread, the new data have also been included. Other names appearing in the list have to do principally with changes in nomenclature or in the determinations of specimens collected earlier. There are 49 of these changes, and the writer has attempted to bring the entire catalogue up to date in this regard. Nine species are listed as unverified.

Herbaria consulted in the preparation of the list of additions will be indicated by the following initials: (A) Arnold Arboretum; (B) the herbarium of the Provincial Museum of British Columbia at Victoria; (BU) the herbarium of the University of British Columbia at Vancouver; (Br) the private herbarium of Mr. A. H. Brinkman, Craigmyle, Alberta; (E) the herbarium of the Department of Agriculture, Central Experimental Farm, Ottawa, Canada; (G) Gray Herbarium; (P) the herbarium of the Academy of Natural Sciences, Philadelphia; (UA) herbarium of the University of Alberta at Edmonton. Specimens collected by Mr. E. C. Stacey are at the Agricultural Experiment Station, Beaverlodge, Alberta, except for a few duplicates at the Central Experimental Farm.

The original publication of 1934 is referred to throughout as the *Catalogue*. The order of families and genera in the new list is made to conform as well as possible with that of the *Catalogue*. Since the latter was

arranged chiefly in accordance with Engler and Gilg's *Syllabus der Pflanzenfamilien* (9th and 10th editions), the same work has been followed in the new list.

The collections of Mrs. Mary G. Henry in the season of 1933 were not available until the text of the original catalogue had been set up in type; but it was examined hurriedly, and most of the species which made additions to the flora were included.³ Subsequently this collection was examined more carefully, and was found to contain a few more new records which began the list of additions given in this paper. A brief itinerary of Mrs. Henry's journey of 1933 is as follows: June 28, reached Peace River from Edmonton; July 5, forded Graham River; July 11, camped in Laurier Pass for a few days; July 14, reached Caribou Pass; July 18, Akie Pass; July 19, camped on Akie River for several days; July 22, started return journey; July 25, Caribou Pass; July 31, Laurier Pass; August 2, Cypress Pass; August 7, Hudson Hope. One hundred eighty-nine numbers of flowering plants and ferns were collected on this trip.

Mrs. Henry again visited northern British Columbia in the season of 1935, making a long and difficult journey from Ft. St. John all the way across the northern part of the province to Telegraph Creek. On this occasion she collected 231 numbers and made many additions to the known flora of the region. The following is an abbreviated sketch of this expedition which Mrs. Henry has very kindly contributed.

"On July 10, 1935 I left Ft. St. John, accompanied by my daughter Josephine. Our outfit consisted of five men and twenty-nine horses.

"We followed along the Peace and Halfway Rivers in a northwesterly direction, gradually winding into the mountains. We rode as far as our horses could carry us comfortably each day, usually about fifteen or twenty miles excepting when our way led us through bogs or across rivers.

"We traversed Laurier Pass and crossed the upper Halfway River the 23d. Continuing north we forded the Sikanni Chief River the 25th, the Besa River the 26th, and reached the Prophet River the 31st.

"August 4th we rafted the Musqua River and on the 9th we forded the Tuchodi River and camped on Lake Tuchodi. We spent a few days here mountain climbing, fishing and hunting.

"August 21st we crossed the Chisca River and once again I saw Mt. Mary Henry.

"We camped on the Tetsa River the 22d, and reached the Pass between Mt. St. Paul and Mt. St. George the next day. From here I went off with two men back packing into the mountains for three days to visit Mt. Mary Henry.

"August 31st we forded the Racing River and camped on the Toad River. This part of the country is inhabited by the Sikanni Indians and we frequently found their camps. The chief's son and two relatives joined us here for the remainder of our journey while two of our men returned with some of the horses.

³l. c. p. 23, footnote.

"We reached Muncho Lake September 3d and went over the Gundahoo Pass September 4th.

"We crossed the Rabbit River the 9th, the Kechika River the 11th and over Sand Creek Pass the 15th.

"We reached McDame Creek and Dease River September 22d, after covering about 1200 miles on horse and foot and for the fourth year adding new mountains and other features to Canada's map."

On all of Mrs. Henry's trips, she has had as guide Mr. K. F. McCusker, formerly of the Canadian Topographical Survey, who has carefully located the routes and contributed substantially to the maps of the country. These maps may be consulted for more details on the localities visited.⁴

Mr. Herbert Groh began his weed surveys in the Peace River agricultural districts in the autumn of 1929, after which a brief provisional review was published.⁵ Most of his work of this season consisted in the accumulation of field notes in the vicinity of Beaverlodge, Alta., and along the roads between there and Pouce Coupé, B. C., and in the direction of Grande Prairie. It was done on Oct. 8-11, inclusive, and was the beginning of a series of surveys, made every five years, to provide "for at least one such area in Canada a more or less adequate weed history." A second, more extended journey was made in the three weeks beginning Aug. 28, 1934, during which Mr. Groh visited all of the principal farming districts of the Peace River region. On this trip he made copious notes and much larger collections than were possible in 1929. A short trip was also made in 1935 to settlements on the Athabaska River (Athabaska and Barrhead). As a result of these field studies a bulletin was published⁶ containing a comprehensive list of species and a table showing their general distribution within the region. The present writer has drawn freely upon this excellent paper for notes on frequency and local distribution, and has made direct quotations from it in many cases. The use made of it in the following list, however, does not begin to do it justice, for only such items were selected as made additions to the catalogue of 1934.

In 1939 Mr. Groh again visited the Peace River country, beginning his collections on Aug. 22, and finishing them on Sept. 21. He re-examined most of the agricultural districts, returning with a much larger collection than had been made on previous trips. This collection, of approximately

⁴Most of the localities mentioned by Mrs. Henry are to be found on the following maps: National Topographic Series, sheet No. 94 S. E. (Hudson Hope); British Columbia, sheet no. 94 B (Halfway River); Northern British Columbia, map no. 1-H, published in 1933. Mrs. Henry published a rather detailed and sumptuously illustrated paper in the National Horticultural Magazine (13: 60-75, 162-181, 269-290, 363-383, 1934). The photographs in this paper include many habit pictures of the plants of the region, and the article is replete with notes on flower color and the local habitat selection of species.

⁵GROH, H. Grande Prairie Weeds — A Provisional Review. Dept. Agr. Can. Pamphlet No. 117, N.S., 1930.

⁶GROH, H. Peace-Athabaska Weeds, a Reconnaissance Appraisal. Dept. Agr. Can. Publ. no. 556, Tech. Bull. no. 7, 1937.

440 field members, has served to verify most of his earlier field notes, and has made substantial contributions to our knowledge of the flora.

Mr. Groh's collections of 1929, 1934, and 1935 were not numbered. Consequently, in citing them the dates on which they were made have been included. The 1939 collections, however, have serial field numbers by which they are cited, and the following itinerary is needed to make the data complete.

DATES	LOCALITIES	FIELD NUMBERS
Aug. 22	Watino, Spirit River	642-644
Aug. 23-24	Beaverlodge, South Wapiti	645-691
Aug. 25	Saskatoon Mt., and Vicinity, near Beaverlodge	1216, 692-716
Aug. 27	Attachie, B. C., and along Halfway R., near Farrell, B. C.	718-722
Aug. 28-31	Hudson Hope, B. C.	723-817
Sept. 1	Bear Flat, B. C.	818
Sept. 2	Taylor, B. C., and Vicinity	819-831
Sept. 4	Dawson Creek, B. C., and Rolla, B. C.	832-836
Sept. 6	Beaverlodge, Lower Beaverlodge, and Hythe	837-859, 1181
Sept. 7	Beaverlodge and Huallan	860-863
Sept. 8	Grande Prairie	864-881
Sept. 9	Beaverlodge, Wembley	882-885
Sept. 10	Grande Prairie	886-891
Sept. 11-12	Grande Prairie and Vicinity (Bear L., Kleskun L.)	892-923
Sept. 12-13	Spirit River and Vicinity	924-981
Sept. 14	Ryecroft, Wanham, Watino, McLennan, Girouxville	982-994
Sept. 15	Hines Creek, Brownvale	995-1012
Sept. 16	Griffin Creek, Grimshaw, Berwyn, Peace River	1013-1035
Sept. 17	McLennan, Kathleen, and L. Kimiwan	1036-1053
Sept. 18	Kenzie, High Prairie	1054-1061
Sept. 19	Grouard and Vicinity, (Prairie Echo, High Prairie, Salt Prairie, Heart River, Enilda, Grouard)	1062-1077
Sept. 21	Calahoo, Rockfort Bridge, Greencourt, Meyerthorpe	1080-1087
Sept. 23-24	Bonnyville, St. Paul, Cold Lake	1088-1119, 1217, 1218

The collections of Sept. 23-24 are from northeast of Edmonton, so that they are not in our region. Those of Sept. 21 have been included, however, as they come from the Athabaska drainage.

A few miscellaneous collections by other workers have come through Mr. Groh as loans from the herbarium of the Experimental Farm at Ottawa. The names of these collectors are included in the list, with dates and localities.

Dr. E. H. Moss of the University of Alberta has very kindly gone through his field notes and collections from the Peace-Athabaska district in search of records that would make additions to the flora. Records of his collections of 1934 are included here, as are also a few from his trip of 1931 which

escaped notice in the original catalogue. In 1941 Dr. Moss again visited the district and collected about 200 numbers of flowering plants and ferns which have yielded many additions. His itinerary for this trip is as follows:

DATES	LOCALITIES	FIELD NUMBERS
July 15	Slave Lake	6053-6072
July 15-16	Widewater, Lesser Slave L.	6073-6080
July 16	Canyon Creek, Lesser Slave L.	6081
July 16-18	Peace River	6084-6138
July 19	Dixonville, N. of Grimshaw	6139-6154
July 19	White Mud R., N. of Grimshaw	6156-6157
July 20-21	Notikewin and vicinity	6158-6193
July 22-24	Faust, Lesser Slave L.	6194-6231
July 25	Canyon Creek, Lesser Slave L.	6238-6248
July 26	Martin River and vicinity, N. shore of Lesser Slave L.	6249-6278
July 27-28	Canyon Creek, Lesser Slave L.	6280-6291
July 29	Smith	6298-6304

Most of the records for the Lesser Slave Lake District in the original catalogue were cited from specimens collected by Mr. A. H. Brinkman of Craigmyle, Alberta. These were seen at the herbarium of the New York Botanical Garden, or were loaned from Cornell University. Since then Mr. Brinkman has very kindly supplied a comprehensive numerical list of his collections about Lesser Slave Lake, from which many additional records have been drawn. He has also loaned a number of specimens so that doubtful records could be checked.

In the summer of 1930 the Pacific Great Eastern Railway made an extended topographical and geological survey of the upper Peace River. A geological assistant in the field party, Dr. Roy Graham, made a rather large collection of plants which is now to be found at the University of British Columbia. A list of species and a general description of the vegetation, together with an itinerary, were published by Dr. Graham in 1934.⁷ Small collections were made on June 22 on a small island in the Peace River at Finlay Forks, and on June 23 along Lost Cabin Creek, a small tributary to the Peace about 3 miles east of Finlay Forks. The main collection was made between June 28 and the end of August in the southern half of what is known as the "Dominion Block," or the "Peace River Block," a partially agricultural district approximately between latitudes 55°30' and 56°45', and longitudes 120° and 122°. The following is a condensed itinerary given by Graham (l. c. p. 14). "From Hudson Hope by boat down the Peace to the Alberta boundary and back to Hudson Hope; then by pack-train southward to the west end of Moberly Lake, and on to East Pine via Jackfish Lake; from East Pine by pack-train up the Pine River to Peavine Flats (about 7 miles west of the Block boundary) and back to East Pine;

⁷GRAHAM, ROY. Notes on the Flora of the Peace River. Rept. of the Prov. Mus. Nat. Hist., B.C., for 1933, pp. 13-24 (1934).

from there northward and eastward to Sunset Prairie, and then southward and eastward through Kiskatinaw (Arras), finishing up the season at Dawson Creek."

About 250 species of flowering plants and ferns are listed by Graham. The writer has seen only a few of the specimens (39), selected because they seemed to make unique additions to the known flora of the district.⁸ Most of the other records published by Graham which are additions to the catalogue of 1934 have been substantiated by material from other collectors (chiefly from Mr. Groh and Mrs. Henry), but these records are mentioned in the new list. A few of Graham's records, however, still remain unchecked, and are included in the list provisionally.⁹

A considerable number of specimens have been sent to the writer from the herbarium of the Provincial Museum of British Columbia at Victoria. These were collected by several people who were either living in the Peace River district or travelling there, and whose names are given in the list along with the localities and dates of their collections. The largest single collection in this group was made in the spring and summer of 1938 by Mr. I. McT. Cowan, and contains 44 field numbers. A few records from this museum also reached the writer through Dr. G. N. Jones, to whom the specimens had been sent for determination.

A very interesting collection, principally of grasses and sedges, was loaned by Mr. E. C. Stacey of the Agricultural Experiment Station at Beaverlodge. The specimens were gathered in the summers of 1925 and 1926 in the Beaverlodge district, and were in support of an excellent thesis prepared by Mr. Stacey describing the vegetation of that district. Unfortunately this paper remains unpublished.

ACKNOWLEDGMENTS

It is a pleasure to acknowledge the many kindnesses bestowed by the persons who have contributed material for this paper. The writer is particularly indebted to Mr. Herbert Groh, to Mrs. Mary G. Henry, and to Dr. E. H. Moss for entrusting him with their large collections of specimens, and for their patience in answering the many queries that came up as the

⁸Most of these additions proved to be based upon misdeterminations. The following are the names under which they appeared in Graham's published list, with the necessary corrections: *Phegopteris alpestris* = *Athyrium Filix-femina*, *Juniperus scopulorum* = *J. horizontalis*, *Juncus oreganus* = *J. alpinus*, *Maianthemum bifolium* = *M. canadense* var. *interius*, *Sisyrinchium idahoense* = *S. angustifolium*, *Goodyera Menziesii* = *G. repens*, *Urtica Lyallii* = *U. gracilis*, *Stellaria umbellata* = *S. longipes*, *Actaea spicata* and *A. arguta* = *A. rubra*, *Aconitum columbianum* = *A. delphinifolium*, *Heuchera cylindrica* = *H. Richardsonii*, *Oxytropis monticola* = *O. spicata*, *O. Lambertii* = *O. splendens*, *Osmorhiza nuda* = *O. obtusa*, *Vaccinium oreophilum* = *V. caespitosum*, *Mertensia ciliata* = *M. paniculata*, *Rhinanthus Crista-galli* = *?R. Kyrollae*, *Lonicera ciliosa* = *L. glaucescens*, *Aster occidentalis* = *A. junceus*, *Antennaria anaphaloides* = *A. campestris*, *Senecio Balsamitae* = *S. pauperculus*, *Hieracium umbellatum* = *?H. canadense*.

⁹These unverified records are: *Corallorrhiza Mertensiana*, *Stellaria crispa*, *Cardamine oligosperma*, *Oenanthe sarmentosa*, *Veronica Anagallis-aquatica*, *Crepis virens*.

material was studied. Likewise Mr. A. H. Brinkman and Mr. E. C. Stacey have provided valuable data directly from their personal notes and collections. Thanks are due to Dr. Francis Kermode, Director of the Provincial Museum of British Columbia, and to Mrs. Winifred V. Hardy, its Recorder of Botany, for arranging the loan of specimens; and to Professor John Davidson of the Department of Botany at the University of British Columbia for the loan of specimens collected by Dr. Roy Graham. The writer wishes also to express his appreciation for the notes contributed on the genus *Polemonium* by Dr. E. T. Wherry of the University of Pennsylvania; and for those of Dr. Francis W. Pennell, of the Philadelphia Academy of Science, on *Castilleja*. He is also indebted to Dr. Pennell for arranging the loan of Mrs. Henry's collections from the Philadelphia Academy.

OPHIOGLOSSACEAE

Botrychium multifidum (Gmel.) Rupr. — *B. matricariaefolium* (Schränk.) Spreng. — *B. ternatum* (Thimb.) Sw. var. *rutaefolium* (A. Br.) D. C. Eat. — See Rept. Mich. Acad. Sci. 13: 86 (1916). — Fort St. John Road, B. C., S. of Peace R., wooded bank of stream, *Groh*, Sept. 17, 1934 (E); among willows in sand dunes, Lesser Slave Lake, Alta., *Moss*, no. 2888 (UA).

POLYPODIACEAE

Dryopteris Linnaeana C. Chr. — *Thelypteris Dryopteris* (L.) Slosson. — This and the following four species were cited in the *Catalogue* under the genus name *Thelypteris*, and should now be placed under *Dryopteris*. The necessary synonymy is given herewith.

Dryopteris Robertiana (Hoffm.) C. Chr. — *Thelypteris Robertiana* (Hoffm.) Slosson.

Dryopteris fragrans (L.) Schott. — *Thelypteris fragrans* (L.) Nieuwl.

Dryopteris spinulosa (O. F. Muell.) Watt. — *Thelypteris spinulosa* (O. F. Muell.) Nieuwl.

Dryopteris spinulosa (O. F. Muell.) Watt. var. *dilatata* (Hoffm.) Watt. — *T. s.* var. *dilatata* (Hoffm.) St. John.

EQUISETACEAE

Equisetum arvense L. forma *serotina* (G. F. W. Mey.) Milde. — Tupper Cr., B. C., *Cowan*, no. 10819 (B), June 7, 1938. — This form is apparently rare. The fruiting fronds turn green and produce branches like those of the sterile fronds.

Equisetum fluviatile L. — Specimens cited in the *Catalogue* under *E. limosum* L. should bear the above name.

LYCOPODIACEAE

Lycopodium clavatum L. — Lesser Slave L. district, *Brinkman*, no. 4676 (Br) — The typical species was not included in the *Catalogue*; only vars. *monostachyon* and *megastachyon*.

PINACEAE

Picea glauca Voss var. *albertiana* (S. Brown) Sarg. — Most of the material cited in the *Catalogue* as typical *P. glauca* probably belongs to this western variety.

Picea Engelmanni (Parry) Engelm. — Laurier Pass, B. C., alt. 4200', *Mrs. Henry*, no. 661 (A). — This material is typical of the species, and does not appear to merge with *P. glauca* as does that collected in the Peace River pass.

Abies balsamea (L.) Mill. — Canyon Creek, Lesser Slave L., *Moss*, no. 6238 (UA, G). — Dr. Moss reports (personal communication) this species is common in the Widewater-Canyon Creek district, and states that he saw no *A. lasiocarpa*.

Pinus Banksiana Lamb. — *P. divaricata* of auth. — McLennan, Alta., *Groh*, no. 1049 (E); Saskatoon Mt., near Beaverlodge, Alta., *Groh*, no. 693 (E). — The finding of *P. Banksiana* in this region accentuates the overlapping of cordilleran and eastern

forest affinities in the upper Peace River country (see *Catalogue*, p. 79). The taxonomic relationship between *P. Banksiana* and *P. contorta* var. *latifolia* (*P. Murrayana*), especially in the region of overlap, is worthy of further study. After his journey of 1941, Dr. E. H. Moss makes the following comments (personal communication): "*Pinus Banksiana* seems to prevail at Smith and on the north shore of Lesser Slave Lake opposite Widewater and Canyon Creek. Between Lesser Slave Lake and Peace River *P. Banksiana* and *P. Murrayana* were observed. At Peace River town both species grow intermixed, with jackpine predominating. Trees showing intermediate characters were rather common in the Slave Lake - Peace River region." It is his opinion "that lodgepole pine is less prevalent than jackpine in the Lesser Slave Lake - Peace River (town) region."

TYPHACEAE

Typha latifolia L. — Slave Lake, *Moss*, no. 6072 (UA). — Reported in the Peace River region by John Macoun in 1872; and Groh lists it as common in the Peace-Athabaska farming country.

SPARGANIACEAE

Sparganium multipedunculatum (Morong) Rydb. — White Mud R., N. of Grimshaw, Alta., *Moss*, no. 6175 (UA). — John Macoun's record for *S. simplex*, between Lesser Slave L. and Hudson Hope in 1872 probably refers to this species. See *Rhod.* 27: 190 (1925).

POTAMOGETONACEAE

Potamogeton praelongus Wulf. — Shore of Tuchodi L., B. C., alt. 4200', *Mrs. Henry*, no. 851 (G, P).

Potamogeton Richardsonii (A. Benn.) Rydb. — Blue L., B. C., *Mrs. Henry*, no. 807 (G, P); Lesser Slave L. District, *Brinkman*, no. 3907 (Br); Faust, Lesser Slave L., *Moss*, no. 6203 (UA).

Potamogeton Friesii Rupr. — Blue L., B. C., *Mrs. Henry*, no. 805 (G, P).

Potamogeton pusillus L. var. **tenuissimus** Mert. & Koch. — Near Martin River, N. shore of Lesser Slave L., *Moss*, no. 6278 (UA, G).

Potamogeton pectinatus L. — In small lime-encrusted lake 15 mi. E. of Kechica R., B. C., alt. 2000', *Mrs. Henry*, no. 927 (G, P); Blue L., B. C., *Mrs. Henry*, no. 808 (G, P); Faust, Lesser Slave L., *Moss*, no. 6202 (UA).

SCHEUCHZERIAEAE

Triglochin palustre L. — Springy ground, Montney, B. C., *Groh*, Sept. 5, 1934 (E); muddy creek margin, Peace River, Alta., *Moss*, no. 6109 (UA, G). — Not previously reported in the Peace River district east of the mountains.

GRAMINEAE

Bromus inermis Leyss. — Reported by Graham in the Peace River Block, B. C., and stated by Groh to be extensively escaped in the Peace River agricultural districts.

Bromus Porteri Nash. — Dry hillside, Peace River, Alta., *Groh*, no. 1026 (E, G).

Bromus secalinus L. — reported by Groh along a roadside near Donnelly, Alta., in 1934.

Festuca saximontana Rydb. — See *Rhod.* 37: 250-2 (1935). — Beaverlodge district, Alta., *Stacey*, no. 35; sandy tract, Hudson Hope, B. C., *Groh*, no. 773 (E, G); prairie near Peace River, Alta., *Moss*, no. 6133 (UA, G). — Records of *Festuca ovina* by Graham, Brinkman and Raup are probably all referable to this species.

Fluminia festucacea (Willd.) Hitchc. — Reported by Brinkman at Marion L., Alta. His specimens (no. 3955) were determined by the late Dr. A. S. Hitchcock. Reported by John Macoun in 1872 (as *Festuca borealis*) between Lesser Slave L. and Hudson Hope, and probably common in wet meadows in many parts of the region.

Glyceria grandis S. Wats. — Beaverlodge district, Alta., *Stacey*, no. 3; Faust, Lesser Slave L., *Moss*, no. 6198 (UA, G).

Puccinellia distans (L.) Parl. var. **tenuis** (Vechtritz) Fern. & Weatherby. — Peace River, Alta., *Groh*, Sept. 12, 1934 (E); ditches and along railway, Spirit River, Alta., *Groh*, nos. 644, 945 (E).

Puccinellia Nuttalliana (Schultes) Hitchc. — *P. airoides* (Nutt.) Wats. & Coult. — Clyde, Alta., *Groh*, July 4, 1935 (E); McLennan, *Groh*, Sept. 15, 1934 (E); Berwyn, Alta., *J. L. Kerns*, Aug. 15, 1939 (E, G); moist ravine, Spirit River, Alta., *Groh*, no. 937 (E, G); muddy creek margin, Peace River, Alta., *Moss*, no. 6108 (UA, G). — The record of John Macoun for *Glyceria airoides* at saline springs along the Peace River above the Smoky probably belongs here.

Poa annua L. — Dawson Creek, B. C., *Groh*, Sept. 1, 1934 (E); garden at Brownvale, Alta., *Groh*, no. 1011 (E). — Reported by Brinkman in the Lesser Slave L. district, and noted by Groh as a troublesome lawn weed in parts of the Peace River agricultural district.

Poa abbreviata R. Br. — Specimens cited in the *Catalogue* under *P. laxa* Haenke belong here.

Poa compressa L. — Beaverlodge district, Alta., *Stacey*, no. 12; railway yards, Spirit River, Alta., *Groh*, no. 933 (E, G). — Reported by Groh as fairly well distributed throughout the Peace River agricultural district.

Poa nervosa (Hook.) Vasey. — Beaverlodge district, Alta., *Stacey*. — On this specimen is the note, "Collected by Godfrey, July 12, 1932, in plots," suggesting that it was introduced.

Poa trivialis L. — Reported by Brinkman in the Lesser Slave L. district. His specimens (no. 4302) were determined by the late Dr. A. S. Hitchcock.

Distichlis stricta (Torr.) Rydb. — See Rhod. 27: 67 (1925). — Alkali slough, Bear L., near Grande Prairie, Alta., *Groh*, no. 894 (E, G). — John Macoun's record of *Brizopyrum spicatum* at saline springs along the Peace R. above the Smoky is undoubtedly referable to this species. It has been found to be common in saline areas in the wood Buffalo Park (Raup, Bot. Invest. Wood Buff. Park, 1935, p. 104).

Agropyron repens (L.) Beauv. — Railway, Peace River, Alta., *Groh*, Sept. 12, 1934 (E); Grande Prairie, Alta., *Groh*, Oct. 11, 1934 (E). — Groh states that this species "is spreading in the West, has already a strong foothold in the Athabaska district, and has increased some in the Grande Prairie and other districts since 1929, when it was found at Beaverlodge and Grande Prairie." Reported by Graham in the Peace River Block, B. C.

Agropyron repens (L.) Beauv. var. **subulatum** (Schreb.) Reichenb. — See Rhod. 35: 182-5 (1933). — Berwyn, Alta., *Groh*, Sept. 13, 1934 (E); roadside, Prairie Echo, Alta., *Groh*, no. 1073 (E).

Agropyron Smithii Rydb. — Railway, Beaverlodge, Alta., *Groh*, no. 861 (E, G); railway at Greencourt, Alta., *Groh*, no. 1085 (E, G). — Reported as a weed by Groh in most parts of the Peace River agricultural district.

Agropyron dasystachyum (Hook.) Scribn. var. **subvillosum** Scribn. & Sm. — Dry hills, Hudson Hope, B. C., *Groh*, no. 798 (E, G). — The combination *Agropyron dasystachyum* was wrongly attributed to Vasey in the *Catalogue*, p. 124.

Agropyron riparium Scribn. & Sm. — Beaverlodge district, Alta., *Stacey*, no. 17-a. — This material appears to be a good match for a duplicate of the type found in the Gray Herbarium.

Agropyron trachycaulum (Link) Malte var. **glaucum** (Pease & Moore) Malte. — Prairie soil, Spirit River, Alta., *Groh*, no. 951 (E, G). — These plants have somewhat pubescent glumes which match a part of the type of var. *pilosiglume* Malte in the Gray Herbarium. This variety, however, may not be worthy of distinction. It was reduced to var. *glaucum* by Fernald in Rhod. 35: pl. 244 (1933).

Agropyron trachycaulum (Link) Malte var. **novae-angliae** (Scribn.) Fern. — Railway at Hythe, Alta., *Groh*, no. 855 (E, G). — Not previously reported in the upper Peace River district east of the mountains.

Secale cereale L. — Groh states that the rye "volunteers wherever grown," and thus becomes a weed in succeeding crops.

Elymus glaucus Buckl. — Noted by John Macoun in 1872 between Lesser Slave L. and Hudson Hope, and by Graham in the Peace River Block, B. C.

Hordeum jubatum L. — Beaverlodge district, Alta., *Stacey*, no. 5, and *Malte*, July 17, 1921 (E); sandy tract, Hudson Hope, B. C., *Groh*, no. 766 (E, G). A common

native grass which becomes weedy in waste cleared areas. No specimens of it were available when the *Catalogue* was published, and its extent was not known.

Trisetum spicatum (L.) Richter var. **molle** (Michx.) Beal. — Notikewin, Alta., *Moss*, no. 6177 (UA). — Not previously noted in the upper Peace - Athabaska district east of the mountains.

Avena sativa L. — Baldonnel, B. C., *Groh*, Sept. 5, 1934 (E).

Avena Hookeri Scribn. — Beaverlodge district, Alta., *Stacey*, no. 13.

Danthonia intermedia Vasey. — Low open place near poplar thicket, Sexsmith, Alta., *Moss*, no. 1797 (UA); prairie, Notikewin, Alta., *Moss*, no. 6161 (UA, G). — Noted in the *Catalogue* only from the mountains (mouth of Wicked R.).

Calamagrostis canadensis (Michx.) Nutt. — Beaverlodge district, Alta., *Stacey*, no. 1; sandy lake shore, Canyon Creek, Lesser Slave L., *Moss*, no. 6247 (UA, G). — The typical species not previously reported, though the larger-flowered varieties are well-known in the upper Peace country.

Calamagrostis canadensis (Michx.) Nutt. var. **robusta** Vasey. — Near Martin River, N. shore of Lesser Slave L., *Moss*, no. 6274 (UA, G). — Not previously noted in the upper Peace - Athabaska district east of the mountains.

Calamagrostis neglecta (Ehrh.) Gaertn. — Reported by Brinkman near Fawcett L. His specimens (no. 3892) were determined by the late Dr. A. S. Hitchcock.

Agrostis stolonifera L. — See Ann. Rept. Nat. Mus. Can. for 1926, pp. 105-26 (1928). — Hythe, Alta., *Groh*, Aug. 31, 1934 (E). — Groh's specimens appear to represent the variety *compacta* Hartm. Graham's record of *A. alba* in the Peace River Block, B. C., probably belongs under this species.

Agrostis scabra Willd. — Dry roadside, Hudson Hope, B. C., *Groh*, no. 728 (E, G); prairie sod, Spirit River, Alta., *Groh*, no. 954 (E, G); dry prairie, Beaverlodge, Alta., *Groh*, no. 661 (E); Beaverlodge district, Alta., *Stacey*, no. 6. — Not recorded in *Catalogue* east of mountains. Groh states that it "increases sometimes in hay meadows to the detriment of quality." This is also the case in the Wood Buffalo Park (Raup, Bot. Invest. Wood Buff. Pk., 1935, p. 86).

Cinna latifolia (Trev.) Griseb. — Dry poplar woods, Hudson Hope, B. C., *Groh*, no. 746 (E, G); Beaverlodge district, Alta., *Stacey*, no. 27. — Not previously reported east of the mountains; specimens collected by Brinkman in the Lesser Slave Lake district not examined.

Alopecurus aequalis Sobol. — Pouce Coupé, B. C., *Groh*, Sept. 1, 1934 (E); McLennan, Alta., *Malte*, July 22, 1921 (E); Beaverlodge, Alta., *Malte*, July 17, 1921 (E); slough, Beaverlodge, Alta., *Groh*, no. 675 (E, G); lake shore, Grouard, Alta., *Groh*, no. 1065 (E); Beaverlodge district, Alta., *Stacey*, no. 25. — Not previously recorded in the upper Peace River district east of the mountains.

Muhlenbergia squarrosa (Trin.) Rydb. — Moist ravine, Spirit River, Alta., *Groh*, no. 936 (E, G); railway, Beaverlodge, Alta., *Groh*, no. 845 (E, G). — John Macoun's record for *Vilfa cuspidata* between Lesser Slave Lake and Hudson Hope may belong here. Mr. Groh's plants appear to represent the erect form of the species which has gone by the name of *M. Richardsonis* (Torr.) Rydb. A record of it in the Wood Buffalo Park was published under this name (Raup, Bot. Invest. Wood Buff. Park, 1935, p. 109).

Stipa columbiana Macoun. — Beaverlodge district, Alta., *Stacey*, no. 23a; *Groh*, Aug. 29, 1934 (E, G); dry field, Lower Beaverlodge, Alta., *Groh*, no. 842 (E, G); sandy loam, bank of drift soil, Spirit River, Alta., *Groh*, no. 979 (E, G); grassland near Rolla, B. C., *Moss*, no. 2380 (UA); dry valley slopes, Peace River, Alta., *Moss*, nos. 6085, 6131 (UA, G). — Groh's plant, no. 979, appears to be intermediate between this species and *S. viridula*. It has a few hairs at the throats of the lower sheaths.

Stipa Richardsonii Link. — Pouce Coupé, B. C., *Malte*, July 15, 1921 (E); sandy tract, Hudson Hope, B. C., *Groh*, no. 762 (E, G).

Phalaris canariensis L. — In yards, Dawson Creek, B. C., *Groh*, Sept. 1, 1934 (E); roadside, Spirit River, Alta., *Groh*, no. 969 (E, G). — Mr. Groh also reports this species at Pouce Coupé, growing about railway yards.

Phalaris arundinacea L. — Beaverlodge district, Alta., *Stacey*, no. 8; border of slough, Slave Lake, Alta., *Moss*, no. 6062 (UA, G). — Previously reported by John

Macoun between Lesser Slave Lake and Hudson Hope, and probably common in wet meadows throughout.

Setaria viridis (L.) Beauv. — Railway yards, Berwyn, Alta., *Groh*, no. 1018 (E). — Also reported by *Groh* at Ft. St. John, B. C., Fairview and Peace River, Alta.

CYPERACEAE

Eriophorum medium Anders. — A specimen cited in the *Catalogue* under *E. chamissonis* forma *albidum* should bear the above name. See *Hultén*, Fl. Kamtchatka I: 161 (1927) for a recent discussion.

Eriophorum viridicarinatum (Engelm.) Fern. — Cited in the *Catalogue* from the mountains, but now reported by *Brinkman* in the Lesser Slave L. district (no. 3887). Specimens not examined.

Eriophorum angustifolium Roth. — Moist sand on bank of Musqua R., B. C., *Mrs. Henry*, no. 787 (G, P).

Eleocharis palustris (L.) R. & S. var. **major** Sonder. — According to the monographer of the genus, Dr. H. K. Svensen, at least a part of the material cited in the *Catalogue* under the typical species (*Raup & Abbe*, no. 4330) should be referred to var. *major*.

Kobresia Bellardi (All.) Degl. — A single individual of this species was overlooked on a sheet of *Carex nardina* var. *Hepburnii* collected by *Raup & Abbe* (no. 3916) on the west slope of Mt. Selwyn, alt. 4–5000'. It may be that other sheets of this number will also contain it.

Carex stenophylla Wahl. var. **enervis** (C. A. Mey.) Kükenth. — Specimens cited in the *Catalogue* as the typical species should be referred to this variety.

Carex stipata Willd. — Open place in aspen woods, Faust, Lesser Slave L., *Moss*, no. 6212 (UA).

Carex interior Bailey. — Reported by *Brinkman* in the Lesser Slave L. district (no. 3881), but specimens not examined. Not previously noted in the Peace River region east of the Mountains.

Carex aenea Fern. — Low place in aspen woods west of Hythe, Alta., *Moss*, no. 2386 (UA).

Carex sychnocephala Carey. — Sandy lake shore, Faust, Lesser Slave L., *Moss*, no. 6231 (UA, G).

Carex macloviana Urv. — McLeod L., B. C., *John Macoun*, 1875. — This specimen, in the Gray Herbarium, was overlooked in the preparation of the *Catalogue*. The species was reported by *Graham* in the Peace River Block, B. C.

Carex scirpoidea Michx. — Not noted in the *Catalogue* east of the Mountains, but reported by *Brinkman* in the Lesser Slave L. district (no. 4653).

Carex Garberi Fern. var. **bifaria** Fern. — See *Rhod.* 37: 253–5 (1935). — Material cited in the *Catalogue* under *C. Hassei* Bailey should be referred to this species.

Carex paupercula Michx. var. **irrigua** (Wahl.) Fern. — Edge of small lake in muskeg, Smith, Alta., *Moss*, no. 6301 (UA).

Carex angarae Steud. — Material cited in the *Catalogue* under *C. VahlII* var. *inferalpina* should be referred to this species according to A. E. Porsild in *Rhod.* 41: 203–5 (1939).

Carex Kelloggii Boott. — Slough along Peace R. about 6 mi. below the mouth of the Wicked, *Raup & Abbe*, nos. 4019, 4022. — These numbers were cited in the *Catalogue* under *C. lenticularis* Michx., but Mr. J. W. Stacey, who has since been over the collection, has identified them as above.

Carex misandra R. Br. — Caribou Pass, B. C., alt. 6800', *Mrs. Henry*, no. 624 (G, P). — Also reported by *Graham* in the Peace River Block, B. C.

Carex lanuginosa Michx. — Beaverlodge district, Alta., *Stacey*, no. 31.

Carex montanensis Bailey. — Damp turfy slope on Mt. Selwyn, alt. about 4500'. *Raup & Abbe*, no. 4145. — cited in the *Catalogue* under *C. ambusta* Boott.

Carex trichocarpa Muhl. var. **aristata** (R. Br.) Bailey. — *C. atherodes* Spreng. — Low place on sandy lake shore, Canyon Creek, Lesser Slave L., *Moss*, no. 6243

(UA, G). — Previously reported, without specimens, near Hudson Hope by Raup in 1932.

Carex retrorsa Schw. — Low place in virgin poplar-spruce forest, Widewater, Lesser Slave L., *Moss*, no. 6074 (UA, G). — Not previously reported in the upper Peace - Athabaska country east of the mountains.

LEMNACEAE

Lemna trisulca L. — In small lake surrounded by muskeg, Smith, Alta., *Moss*, no. 6299-a (UA). — Reported by John Macoun between Lesser Slave L. and Hudson Hope in 1872.

Spirodela polyrhiza (L.) Schleid. — Stagnant pool, High Prairie, Alta., *Groh*, no. 1077 (E, G).

JUNCACEAE

Juncus bufonius L. — Wet ground, Widewater, Alta., *Groh*, Sept. 17, 1934 (E); by stream, Mayerthorpe, Alta., *Groh*, no. 1087 (E); open place in aspen woods, Faust, Lesser Slave L., *Moss*, no. 6213 (UA, G). — Previously reported by John Macoun between Lesser Slave L. and Hudson Hope in 1872.

Juncus Dudleyi Wieg. — Sandy lake shore at edge of stream mouth, Faust, Lesser Slave L., *Moss*, no. 6204 (UA, G).

Juncus alpinus Vill. var. **rariflorus** (Hartm.) Hartm. — *J. alpinus* var. *insignis* Fries. — *J. Richardsonianus* Schultes. — See Botaniska Notiser 1932, pp. 313-72, and Rhod. **35**: 233-4 (1933). — Sandy shore, Faust, Lesser Slave L., *Moss*, no. 6206 (UA); near Martin River, N. shore of Lesser Slave L., *Moss*, no. 6276 (UA, G). — This variety is occasional in the central part of the Mackenzie basin, but not previously reported in the southwestern portions.

Juncus castaneus Smith. — Damp moss on sunny hillside, 10 mi. W. of Mt. Dame, B. C., *Mrs. Henry*, no. 949 (G, P).

Luzula arcuata Wahl. — Near small lake on W. slope of Mt. Selwyn, alt. about 5000', *Raup & Abbe*, no. 4098. — This specimen was erroneously cited in the *Catalogue* under *L. parviflora*.

LILIACEAE

Lilium philadelphicum L. var. **andinum** (Nutt.) Ker. — Peace River, Alta., *Mrs. Henry*, no. 662 (G, P); Saskatoon Mt., near Beaverlodge, Alta., *Groh*, no. 701 (E, G). — Only a yellow-flowered form *immaculatum* of this variety was previously reported in the upper Peace River region.

Asparagus officinalis L. — Noted by Groh as an occasional wayside escape in the agricultural district.

Streptopus amplexifolius (L.) DC. var. **americanus** Schultes. — Specimens cited in the *Catalogue* under the typical species should be referred to this variety according to Dr. N. C. Fassett in Rhod. **37**: 88-113 (1935).

ORCHIDACEAE

Habenaria viridis (L.) R. Br. var. **interjecta** Fern. — Specimens cited in the *Catalogue* under var. *bracteata* probably all belong here (see Rhod. **28**: 173, 1926). Also collected by Groh at Hudson Hope, B. C. (no. 792, E), in the Beaverlodge district, Alta., by Stacey, and at Bear Flat, B. C., by Freer (no. 10206, B).

Goodyera repens (L.) R. Br. — Specimens cited in the *Catalogue* under *Epipactis repens* should bear this name.

Goodyera decipiens (Hook.) Hubbard. — Specimens cited in the *Catalogue* as *Epipactis decipiens* belong under this name.

Corallorrhiza striata Lindl. — Peace River district, B. C., *Miss Bertrand*, 1933, no. 9430 (B).

CORALLORRHIZA MERTENSIANA Bong. — Reported by Graham in the Peace River Block, B. C.

SALICACEAE

Salix MacCalliana Rowlee. — Moist meadow, Deep Creek, B. C., *Mrs. Henry*,

no. 675 (A, P); meadow near stream east of Rabbit R., B. C., *Mrs. Henry*, no. 919 (A, P); dry muskeg, Dixonville, N. of Grimshaw, Alta., *Moss*, no. 6143 (UA, G).

Salix glauca L. — Dry muskegs, Notikewin, Alta., *Moss*, no. 6167 (UA, G), and Dixonville, N. of Grimshaw, Alta., *Moss*, no. 6142 (UA, G). — Noted in the *Catalogue* only from the mountains. Brinkman reports it (as var. *glabrescens* Schn.) in the Lesser Slave L. district (no. 4657), but his specimens have not been seen by the writer.

Salix discolor Muhl. — Some sterile specimens cited in the *Catalogue* under *S. arbusculoides* suggest this species, and there is a sterile specimen at the National Herbarium of Canada, collected by C. R. Ball, 17 mi. N. E. of Clyde, Alta., which has been named *S. discolor*. Another sterile twig, collected by Groh along a roadside at Grande Prairie, Alta., (no. 886, E, A), probably also belongs here; and one collected by Brinkman (no. 3869) at Lesser Slave Lake appears to be good *S. discolor*. As yet no flowering material is available.

Salix Scouleriana Barr. — Moist soil on hillside, Dease L., B. C., *Mrs. Henry*, no. 954 (A, P); sandy loam, on drift soil, Spirit River, Alta., *Groh*, no. 981 (E, A); virgin poplar-spruce forest, Widewater, Lesser Slave L., *Moss*, no. 6076 (UA, G).

BETULACEAE

Betula papyrifera Marsh. var. **neolaskana** (Sarg.) Raup. — Tetsa R., B. C., alt. 3800', *Mrs. Henry*, no. 887 (A, P). — Previously reported in our region only in the eastern part.

MORACEAE

Cannabis sativa L. — Farmyard, Spirit River, Alta., *Groh*, no. 972 (E, G).

URTICACEAE

Urtica urens L. — Beaverlodge, Alta., *Groh*, Aug. 29, 1934 (E); and no. 646 (E, G). — Noted by Groh as observed only at Beaverlodge, and not occurring abundantly.

LORANTHACEAE

Arceuthobium americanum Nutt. — Although no specimens are available, this species is probably common throughout the region. Groh noted it on *Pinus contorta* var. *latifolia* at Dawson Creek, and Brinkman reported it in the Lesser Slave L. district.

POLYGONACEAE

Rumex Acetosella L. — Reported by Groh at Beaverlodge, Alta., and in the Athabaska district.

Rumex mexicanus Meisn. — Sandy shore near Martin River, N. shore of Lesser Slave L., *Moss*, no. 6268 (UA, G). — Reported by Groh as rather widely distributed in the agricultural districts, "growing in waste places, damp meadows and on slough margins."

Polygonum achoreum Blake. — Garden, at Grande Prairie, Alta., *Groh*, no. 889 (E, G).

Polygonum scabrum Moench. — *P. tomentosum* (Schrank.) Bickn. — See Rhod. 23: 259 (1921). — Slough and stream banks, Grande Prairie, Alta., *Groh*, nos. 876, 912 (E, G); lake shore at Grouard, Alta., *Groh*, no. 1066 (E, G).

Polygonum Douglasii Greene. — Edge of field, Beaverlodge, Alta., *Groh*, no. 849 (E, G). — John Macoun's record of *P. tenue* between Lesser Slave L. and Hudson Hope in 1872 may belong here.

Polygonum coccineum Muhl. — Sand dunes at lake shore, near Martin River, N. shore of Lesser Slave L., *Moss*, no. 6255 (UA, G). — These specimens represent the terrestrial form of the species (forma *terrestre* (Willd.) Stanford).

Polygonum Convolvulus L. — Along railway, Peace River, Alta., *Moss*, no. 6104 (UA). — Reported by Groh as a common weed throughout most of the agricultural districts. Also noted by Graham in the Peace River Block, B. C., and earlier by John Macoun between Lesser Slave L. and Hudson Hope.

Fagopyrum esculentum Moench. — Noted by Groh as "sparingly persisting after cultivation."

CHENOPODIACEAE

Chenopodium capitatum (L.) Asch. — Garden, Beaverlodge, Alta., *Groh*, no. 647 (E, G); Hudson Hope, B. C., *R. J. Ferguson*, Aug. 29, 1939 (E). — Not previously collected in the Peace River district east of the mountains, but reported by Groh as common throughout, especially as a weed in new clearings.

Chenopodium glaucum L. — Recently seeded roadside, Griffin Creek, S. of Brownvale, Alta., *Groh*, no. 1014 (E); moist ground, Beaverlodge, Alta., *Groh*, no. 847 (E); garden, Beaverlodge, Alta., *Groh*, no. 645 (E, G); denuded bench of river valley, Peace River, Alta., *Moss*, no. 6136 (UA). — Reported by John Macoun in 1872 between Lesser Slave L. and Hudson Hope, and in 1875 at saline springs along the Peace River above the Smoky.

Chenopodium rubrum L. — Reported by Groh in saline places at Peace River, Alta.

Atriplex patula L. var. *hastata* (L.) Gray. — Roadside, Grande Prairie, Alta., *Groh*, no. 910 (E, G). — Groh states that both the species and the variety are "occasionally seen in waste places, particularly under saline conditions."

Atriplex hortensis L. — Escape from garden, Peace River, Alta., *Groh*, Sept. 12, 1934 (E).

Monolepis Nuttalliana (Schultes) Greene. — Dooryard, North Pine, *Groh*, Sept. 6, 1934 (E); Beaverlodge, Alta., *Groh*, Oct. 9, 1929 (E); railway yard, Peace River, Alta., *Groh*, no. 1027 (E). — Noted by Groh as "occasional in somewhat alkaline spots, and at times a crop weed right across the belt."

Axyris amaranthoides L. — Cultivated fields, Peace River, Alta., *J. Bostock*, Aug. 1926 (E); neglected garden, Peace River, Alta., *Moss*, no. 6110 (UA); railway, Hines' Creek, Alta., *Groh*, no. 1000 (E, G). — Groh states that this species has become a common weed of waste land and roadsides throughout the agricultural districts.

Salicornia europaea L. — Alkaline slough, Salt Prairie, Alta., *Groh*, no. 1072 (E, G). — John Macoun's records for *S. herbacea* between Lesser Slave L. and Hudson Hope in 1872, and at saline springs along the Peace R. above the Smoky in 1875 undoubtedly belong here.

Suaeda depressa (Pursh) Wats. — Alkali slough, Bear L., near Grande Prairie, Alta., *Groh*, no. 893 (E, G); ditch, Spirit River, Alta., *Groh*, no. 935 (E, G); alkali slough, Salt Prairie, Alta., *Groh*, no. 1070 (E, G); alkali spot in railway yards, Spirit River, Alta., *Groh*, no. 964 (E, G). — John Macoun's record for *S. maritima* in 1872 between Lesser Slave L. and Hudson Hope probably belongs here.

Salsola Kali L. var. *tenuifolia* G. F. W. Mey. — Pouce Coupé, B. C., *Groh*, Sept. 1, 1934 (E); Beaverlodge, Alta., *Groh*, Oct. 9, 1929 (E); railway yard, Peace River, Alta., *Groh*, no. 1028 (E); railway, Hythe, Alta., *Groh*, no. 857 (E); railway, Rycroft, Alta., *Groh*, no. 984 (E, G). — Found chiefly in the very light soils of railways. Groh thinks that "in the North [it] may spread but little away from railway gravel and some light waste land."

AMARANTHACEAE

Amaranthus graecizans L. — Peace River, Alta., *Groh*, Sept. 12, 1934 (E); cultivated ground, Spirit River, Alta., *Groh*, no. 970 (E, G); railway, Watino, Alta., *Groh*, no. 988 (E, G).

Amaranthus retroflexus L. — Garden, Peace River, Alta., *Groh*, Sept. 12, 1934 (E); railway, Rycroft, Alta., *Groh*, no. 982 (E); cultivated ground, Spirit River, Alta., *Groh*, no. 971 (E, G); railway, Watino, Alta., *Groh*, no. 987 (E).

CARYOPHYLLACEAE

Stellaria calycantha (Ledeb.) Bong. — Material cited under *S. borealis* in the *Catalogue* should bear this name. See Hultén, *Fl. Aleut. Isl.* 164-5 (1937); and Fernald, *Rhod.* 42: 254-9 (1940).

STELLARIA CRISPA C. & S. — Reported by Graham in the Peace River Block, B. C.

Stellaria media (L.) Cyrill. — Reported by Groh as a rather common weed in the

agricultural districts, and noted by John Macoun in 1872 between Lesser Slave L. and Hudson Hope.

Cerastium vulgatum L. — Widewater, Alta., *Groh*, Sept. 17, 1934 (E). — This specimen is only a rosette with runners, and is somewhat doubtfully determined. This species is reported by *Groh* as a weed also at Peace River, Alta., and in the Athabaska district.

Arenaria dawsonensis Britton. — Moist rocky debris along a creek near Tuchodi L., B. C., *Mrs. Henry*, no. 822 (G, P).

Silene repens Patrin. — Dry clay and limestone rocks, mountain near Tuchodi L., B. C., alt. 6000', *Mrs. Henry*, no. 842 (G, P); stony peat in grass, Mt. of the Gods, Prophet R., B. C., alt. 5500', *Mrs. Henry*, no. 775 (G, P); dry sandy clay and peat, mountain near Besa R., B. C., alt. 5000', *Mrs. Henry*, no. 760 (G, P).

Silene latifolia (Mill.) Britten & Rendle. — Reported by *Groh* as a weed at Beaverlodge, Alta.

Lychnis alba Mill. — Athabaska, Alta., *Groh*, July 3, 1935 (E); roadside, Widewater, Alta., *Moss*, no. 6075 (UA, G). — *Groh* reports it as a weed in the Athabaska district.

Lychnis Drummondii Wats. — Roadside at Taylor, B. C., *Groh*, no. 829 (E, G); prairie on dry valley slope, Peace River, Alta., *Moss*, no. 6101 (UA, G). — Reported by John Macoun in 1872 between Lesser Slave L. and Hudson Hope.

CERATOPHYLLACEAE

Ceratophyllum demersum L. — In small lake surrounded by muskeg, Smith, Alta., *Moss*, no. 6299 (UA).

RANUNCULACEAE

Anemone canadensis L. — Ft. Vermilion, Alta., *F. S. Lawrence*, 1907 (E); Rye-croft, Alta., *Mrs. Henry*, no. 373 (P); low ground, High Prairie, Alta., *Groh*, no. 1059 (E); under willows and poplars near a slough, Slave Lake, Alta., *Moss*, no. 6067 (UA, G). — Previously reported by Brinkman in the Lesser Slave L. district, and by John Macoun between Lesser Slave L. and Hudson Hope in 1872.

Ranunculus trichophyllus Chaix var. **typicus** Drew. — See *Rhod.* 38: 1-47 (1936). — Specimens cited in the *Catalogue* under *R. aquatilis* var. *capillaceus* belong here, as well as specimens collected by *Groh* (nos. 947, 956, E) in 1939 at Beaverlodge, Alta.

Ranunculus Gmelini DC. var. **Purshii** (Richards.) Hara. — Specimens cited in the *Catalogue* under *R. Purshii* should bear this name. See *Rhod.* 41: 385-6 (1939).

Ranunculus hyperboreus Rottb. — Damp moss at edge of Blue L., B. C., *Mrs. Henry*, no. 796 (G, P).

Ranunculus pennsylvanicus L. — Slough, Grande Prairie, Alta., *Groh*, no. 878 (E); Widewater, Alta., near shore of Lesser Slave L., *Moss*, no. 2228 (UA); open place in aspen woods, Faust, Lesser Slave L., *Moss*, no. 6211 (UA, G).

Ranunculus acris L. — Railway yards, Grande Prairie, Alta., *Groh*, no. 867 (E, G). — *Groh* reports this species as a weed of increasing importance, but thus far found mostly near railway lines.

CAPPARIDACEAE

Cleome serrulata Pursh. — Railway, Hythe, Alta., *Groh*, no. 856 (E, G). — *Groh* reports only a single colony near a grain elevator at Hythe, and states that it is probably an introduction.

CRUCIFERAE

Draba nivalis Liljebl. — Specimens collected on a mountain near Bluebell Mt., B. C., alt. 6500', *Mrs. Henry*, no. 541 (P), are somewhat doubtfully determined thus.

Draba luteola Greene. — Near Graham R., B. C., alt. 3000', *Mrs. Henry*, no. 463 (P); Charlie L., B. C., *Cowan*, June 11, 1938, no. 10821 (B).

Draba glabella Pursh. — Stony peat, Caribou Ridge, B. C., alt. 6300', *Mrs. Henry*, no. 768 (G, P); stony slide, mountain E. of Laurier Pass, B. C., alt. 5500', *Mrs. Henry*, no. 714(?) (G, P); Caribou Pass, B. C., alt. 5000', *Mrs. Henry*, no. 599(?) (P); moun-

tain near Bluebell Mt., B. C., alt. 6500', *Mrs. Henry*, no. 542(?) (P); hilltop in Laurie Pass, B. C., *Mrs. Henry*, no. 505(?) (P). — Several of these specimens are incomplete or without maturing siliques, making their determination uncertain.

Draba McCallae Rydb. — Near Graham R., B. C., alt. 3200', *Mrs. Henry*, nos. 468, 469 (P).

Draba lanceolata Royle. — Graham R., B. C., alt. 3400', *Mrs. Henry*, no. 467 (P); mountain side near Boulder Cr., B. C., alt. 4500', *Mrs. Henry*, no. 482 (P); dry, sunny meadow, middle fork of Nelson R., B. C., alt. 3900', *Mrs. Henry*, no. 740 (G, P); Saskatoon Mt., near Beaverlodge, Alta., *Groh*, no. 1216 (G). — A record of *D. cana* by Graham in the Peace River Block, B. C., may belong here.

Draba nemorosa L. var. **lejocarpa** Lindbl. — See Rhod. **36**: 366 (1934). — Railway, High Prairie, Alta., *Groh*, no. 1061 (E, G); dry land, Beaverlodge, Alta., *Groh*, no. 686 (E, G); railway, McLennan, Alta., *Groh*, no. 1040 (E). — Specimens cited in the *Catalogue* under *D. nemorosa*, collected near Dawson Creek (*Raup & Abbe*, no. 3519), appear to represent the above variety.

Lesquerella arctica (Wormsk.) Wats. — See Rhod. **35**: 267-70 (1933). — Dry rocky débris, mountain near Tuchodi L., B. C., alt. 6000', *Mrs. Henry*, no. 848 (P).

Thlaspi arvense L. — Waste ground, Beaverlodge, Alta., *Groh*, no. 848 (E). — Reported by Groh as a common and obnoxious weed throughout the agricultural districts.

Lepidium sativum L. — Roadside recently seeded to grass, Griffin Creek, S. of Brownvale, Alta., *Groh*, no. 1013 (E, G).

Cardaria Draba (L.) Desv. var. **repens** (Schrenk.) O. E. Schulz. — *Lepidium Draba* L. — See Rhod. **42**: 302-6 (1940). — Waste places, Grand Prairie, Alta., *M. Davies*, Aug. 1929 (E); Tepee Creek, Alta., *Jack Head*, Aug. 1928 (E); Pouce Coupé, B. C., *Sgt. Greenwood*, Aug. 1932 (B); six mi. E. of Grande Prairie, Alta., *Groh*, no. 906 (E, G). See also Groh in Can. Field Nat. **55**: 55 (1941) for further notes on the history of this plant and the next in Canada.

Cardaria pubescens (Meyer) Rollins var. **elongata** Rollins. — See Rhod. **42**: 302-6 (1940). — Six mi. E. of Grande Prairie, Alta., *Groh*, no. 907 (E); yards and fields, Rolla, B. C., *Groh*, nos. 835, 836 (E); field, Grimshaw, Alta., *Groh*, no. 1016 (E, G).

Camellina sativa (L.) Crantz. — Rose Prairie, B. C., *Groh*, Sept. 6, 1934 (E); Beaverlodge, Alta., *Groh*, Oct. 9, 1929 (E); roadside, Taylor, B. C., *Groh*, no. 827 (G); Kleskun Lake bottom, E. of Grande Prairie, Alta., *Groh*, no. 900 (E, G). — Reported (with *C. microcarpa*) as common throughout most of the agricultural districts.

Camellina microcarpa Andr. — Athabaska, Alta., *Groh*, July 3, 1935 (E); Hythe, Alta., *Groh*, Aug. 31, 1934 (E); Beaverlodge, Alta., *Groh*, Aug. 29, 1934 (E) and Oct. 9, 1929 (E); Barrhead, Alta., *Groh*, June 27, 1935 (E).

Neslia paniculata (L.) Desf. — Reported by Groh as common and widespread in the agricultural districts — "One of the chief mustards in all the grain-growing parts." Also noted by Graham in the Peace River Block, B. C.

Erucastrum gallicum (Willd.) Schulz. — Brownvale, Alta., *Groh*, Sept. 13, 1934 (E); Greencourt, Alta., *Groh*, no. 1083 (E, G), Calahoo, Alta., *Groh*, no. 1080 (E, G); Rochfort Bridge, Alta., *Groh*, no. 1081 (E, G); McLennan, Alta., *Groh*, no. 1053 (E). — Mainly along railways.

Brassica Kaber (DC.) Wheeler var. **pinnatifida** (Stokes) Wheeler. — *Brassica arvensis* (L.) Ktze. — See Rhod. **40**: 306-9 (1938). — Girouxville, Alta., *Groh*, no. 991 (E, G); McLennan, Alta., *Groh*, no. 1043 (E); Hines Creek, Alta., *Groh*, no. 996 (E); Spirit River, Alta., *Groh*, no. 643 (E).

Brassica campestris L. — Railway, Grande Prairie, Alta., *Groh*, no. 874 (E). — Also reported by Groh at Athabaska.

Conringia orientalis (L.) Dumort. — Hythe, Alta., *Groh*, Aug. 31, 1934 (E). — Groh states that this has been "Five times recorded from end to end of the belt."

Sisymbrium altissimum L. — Roadside near Taylor, B. C., *Moss*, no. 2372 (UA). — Reported by Groh as widespread and common throughout the agricultural districts, "but chiefly yet as a weed of railways and waste places."

Descurainia Sophia (L.) Wats. — Waste places, Halcourt, Alta., *Groh*, Oct. 11, 1929 (E); Beaverlodge, Alta., *Groh*, Oct. 9, 1929 and Aug. 29, 1934 (E); Hythe, Alta., *Groh*, Aug. 31, 1934 (E); Ft. St. John, B. C., *Groh*, Sept. 7, 1934; railway, Hines Creek, Alta., *Groh*, no. 997 (E, G). — *Groh* reports this species (under *Sisymbrium Sophia*) as a common and widespread weed.

Descurainia Richardsonii (Sweet) O. E. Schulz. — Ft. St. John, B. C., *Groh*, Sept. 7, 1934 (E); railway yards, Brownvale, Alta., *Groh*, no. 1001 (E, G); railway and roadsides, Beaverlodge, Alta., *Groh*, nos. 884 (E, G), 862 (E); waste places, High Prairie, Alta., *Groh*, no. 1076 (E, G); railway yards, Berwyn, Alta., *Groh*, no. 1019 (E); sandy lake shore, Canyon Creek, Lesser Slave L., *Moss*, no. 6246 (UA, G). — *Groh*'s records of *Sisymbrium Hartwegianum* ("at Fort St. John and occasionally throughout") should be referred to this species. His specimens from Hudson Hope, B. C., no. 816 (E), are doubtfully placed here. *Descurainia Richardsonii* is in the *Catalogue*, but had been collected only on the Halfway River, B. C.

Braya purpurascens (R. Br.) Bunge. — Specimens somewhat doubtfully so determined were collected by *Mrs. Henry* on a mountain near Caribou Pass, B. C., alt. 6500', no. 611 (P); on a mountain near the source of Akie R., B. C., alt. 5500', no. 570 (P); and on the Nelson R., B. C., alt. 4200', no. 523 (P).

Braya Richardsonii Fern. — Graham R., B. C., alt. 4000', *Mrs. Henry*, no. 501 (P).

Hesperis matronalis L. — Reported by *Groh* only at Athabaska, Alta.

Erysimum cheiranthoides L. — Open ground, Bear Flat, Peace R., B. C., *Phyllis Freer*, July 12, 1935 (B); railway, Grande Prairie, Alta., *Groh*, no. 864 (E, G). — Previously reported in 1872 between Lesser Slave L. and Hudson Hope by John Macoun, and at McLeod L. in 1879 by G. M. Dawson. *Groh* considers this species, so far as its character as a weed is concerned, "One of the worst of the native mustards." He reports it throughout the agricultural district.

Rorippa islandica (Oeder) Borbás var. **microcarpa** (Regel) Fern. — Material cited in the *Catalogue* under *R. palustris* var. *glabrata* should bear the above name. See *Rhod.* 42: 25-32, 267-74 (1940).

Rorippa islandica (Oeder) Borbás var. **hispida** (Desv.) Butters & Abbe. — *R. palustre* var. *hispida* of auth. — See *Rhod.* 42: 25-32 (1940). — Lesser Slave L. district, *Brinkman*, no. 4563 (N, Br); sandy beach, Canyon Creek, Lesser Slave L., *Moss*, no. 6280 (UA, G). — The *Brinkman* number was cited in the *Catalogue*, incorrectly, under *R. palustris* var. *glabrata*.

Armoracia lapathifolia Gilib. — *Radicula Armoracia* of auth. — Reported by *Groh* as an escape at Fairview, Alta.

Barbarea orthoceras Ledeb. — Tupper Cr., B. C., *Cowan*, July 5, 1938, no. 10847 (B). — Previously reported in the upper Peace R. region only in the mountains.

CARDAMINE OLIGOSPERMA Nutt. — Reported by *Graham* in the Peace River Block, B. C. Probably referable to *C. pennsylvanica*.

Arabis lyrata L. var. **kamchatica** Fisch. — See *Rhod.* 39: 88-98 (1937). — Fallow field, Brownvale, Alta., *Groh*, no. 1012 (E). — All of the material cited in the *Catalogue* under *A. lyrata* var. *occidentalis* (*Raup & Abbe*, nos. 3797, 4096, 4153, 4267) should be placed here.

Arabis hirsuta (L.) Scop. var. **pycnocarpa** (Hopkins) Rollins. — See *Rhod.* 39: 112-22 (1937) and 43: 318 (1941). — Dawson Creek, B. C., *Groh*, Sept. 1, 1934 (E); Ft. St. John, B. C., *Groh*, Sept. 4, 1934 (E). Specimens cited in the *Catalogue* under *A. hirsuta* (*Raup & Abbe* nos. 3638, 3581) have been referred to var. *pycnocarpa* by Rollins.

Arabis Holboellii Hornem. — Dr. R. C. Rollins, who has recently monographed *Arabis* in western America, has referred part of the material cited in the *Catalogue* under *A. retrofracta* to the above species: Damp turfey ledge on W. slope of Mt. Selwyn, alt. 4-5000', *Raup & Abbe*, no. 3958. The remainder is referred to the following variety. See *Rhod.* 43: 439-45 (1941).

Arabis Holboellii Hornem. var. **retrofracta** (Grah.) Rydb. — Dry slope of River Bluff at Taylor Flat, *Raup & Abbe*, no. 3573.

Arabis divaricarpa A. Nels. — Railway yard, Brownvale, Alta., *Groh*, no. 1004 (E, G); Lesser Slave L. district, *Brinkman*, no. 4338.

SAXIFRAGACEAE

Tellima grandiflora Dougl. — Previously reported on the Misinchinca R., B. C., by Dawson in 1879, and collected by Graham in the Peace River Block, B. C., no. 396 (BU).

Parnassia palustris L. var. **neogaea** Fern. — See Rhod. **39**: 311 (1937). — Near Saskatoon Mt., Beaverlodge, Alta., *Groh*, no. 706 (E); border of slough, Slave Lake, Alta., *Moss*, no. 6068 (UA, G). — A specimen cited in the *Catalogue* under *P. multiseta* should be referred to this species. Previously reported only in the mountains.

Parnassia parviflora DC. — Moist bank, Hudson Hope, B. C., *Groh*, no. 753 (E, G); Tupper Cr., B. C., *Cowan*, June 6, 1938, no. 10893 (?) (B). — Also reported by Graham in the Peace River Block, B. C.

Ribes hirtellum Michx. — See Rhod. **13**: 73-76 (1911). — Lesser Slave L. district, *Brinkman*, nos. 4167, 4277 (Br.).

ROSACEAE

Aruncus sylvester Kost. — Professor M. L. Fernald, who has recently discussed this group for America (Rhod. **38**: 179-82, 1936), maintains that western material usually cited under *A. acuminatus* cannot be separated from *A. sylvester* of Eurasia.

Sorbaria sorbifolia (L.) A. Br. — Roadside, Peace River, Alta., *Groh*, no. 1022 (E).

Sorbus scopulina Greene. — Saskatoon Mt., near Beaverlodge, Alta., *Moss*, no. 2304 (UA); virgin poplar-spruce forest, Widewater, Lesser Slave L., *Moss*, no. 6078 (UA, G). — Material cited in the *Catalogue* under *S. dumosa* should be placed here. — See Jones in Jour. Arn. Arb. **20**: 1-43 (1939).

Crataegus columbiana Howell. — Hillside at Bear Flat, B. C., *P. Freer*, June 14, 1935, no. 10169 (B). — John Macoun's records of *C. rivularis* at McLeod L., and of *C. Douglasii* at Hudson Hope in 1875 may have been based on this species.

Rubus parviflorus Nutt. forma **bifarius** (Fern.) Fassett. — Specimens cited in the *Catalogue* as typical *R. parviflorus* should have the above name, according to a recent treatment by Fassett in Ann. Mo. Bot. Gard. **27**: 299-374 (1941). See also Fernald in Rhod. **37**: 273-84 (1935). A specimen collected by Groh on Bear Mt., near Dawson Creek, B. C., Sept. 3, 1934 (E), should also be included.

Rubus pedatus Smith. — Mountain in Akie Pass, B. C., alt. 4500', *Mrs. Henry*, no. 589 (P). — Previously known in our region from a single specimen, collected at McLeod L., B. C., by John Macoun in 1875.

Rubus arcticus L. — Swale E. of Beaverlodge, Alta., *Groh*, Aug. 30, 1934 (E); Rose Prairie, B. C., *Groh*, Sept. 6, 1934 (E). — Not noted in the *Catalogue* east of the Rocky Mountains.

Potentilla norvegica L. var. **hirsuta** (Michx.) Lehm. — Noted in the *Catalogue* only near Rocky Mountain Portage, but according to Groh, common throughout the agricultural districts. Groh has collected it at Fahler, Beaverlodge, and Grande Prairie, Alta.

Potentilla millegrana Engelm. — Fahler, Alta., *Groh*, Sept. 4, 1934 (E); bank of stream, Grande Prairie, Alta., *Groh*, no. 918 (G); lake shore, Grouard, Alta., *Groh*, no. 1067 (E, G). — Noted by Groh as occurring particularly on burnt-over land.

Potentilla biflora Willd. — Peat over limestone, Mt. of the Gods, Prophet R., B. C., alt. 6500', *Mrs. Henry*, no. 774 (G, P); mountain near Gathto Cr., B. C., alt. 6300', *Mrs. Henry*, no. 813 (G, P).

Potentilla glabrella Rydb. — High Prairie, Alta., *Groh*, Sept. 15, 1934 (E); dry roadside, Hudson Hope, B. C., *Groh*, no. 730 (E); sandy tract, Hudson Hope, B. C., *Groh*, no. 767 (E, G).

Potentilla gracilis Dougl. subsp. **Nuttallii** (Lehm.) Keck. — See Carn. Inst. Wash. Publ. no. **520**: 134-6 (1940) for a recent treatment of the synonymy of this subspecies. — Beaverlodge, Alta., *Groh*, Oct. 9, 1929 (E); swale E. of Beaverlodge, Alta., *Groh*, Aug. 30, 1934 (E); edge of field, Beaverlodge, *Groh*, no. 850 (E); Dawson Creek,

B. C., *Cowan*, June 27, 1938, no. 10811 (B). — Graham's record of *P. Nuttallii* in the Peace River Block, B. C., may be referable here.

Potentilla Hippiana Lehm. — Dry hill, Cache Cr., B. C., *Mrs. Henry*, no. 679 (G, P).

Potentilla Anserina L. — Moist open ground, Bear L., Alta., *J. Bostock*, Aug., 1926 (E); sandy lake shore near Martin River, N. shore of Lesser Slave L., *Moss*, no. 6264 (UA). — Not noted in the Catalogue east of the Rocky Mountains. Reported by Groh as "frequent in wet situations."

Chamaerhodos Nuttallii Pickering. — See Rhod. **37**: 284-5 (1935). — Turnagain R., B. C., *Mrs. Henry*, nos. 940, 941 (G, P).

Geum aleppicum Jacq. var. **strictum** (Ait.) Fern. — *G. strictum* Ait. — See Rhod. **37**: 293-4 (1935). — Material cited in the Catalogue under *G. strictum* should be referred here. Groh reports this species as rather common and wide-spread in the agricultural districts.

Agrimonia striata Michx. — High Prairie, Alta., *Groh*, Sept. 15, 1934 (E). — Also reported by Groh in the Athabaska district, Alta.

Sanguisorba sitchensis C. A. Meyer. — *S. canadensis* L. var. *latifolia* Hook. — See Hultén, Fl. Aleut. Isls. 232-3 (1937). — Dease R., B. C., *Mrs. Henry*, no. 964 (P). — Dawson's record of *Poterium canadense* on the Misinchinca R. in 1879 may be this species.

LEGUMINOSAE

Medicago sativa L. — Reported by Groh as an escape, especially in the western part of the agricultural district.

Medicago lupulina L. — Reported by Groh as a weed at Beaverlodge and Fahler, Alta.

Medicago falcata L. — Beaverlodge, Alta., *Groh*, Aug. 30, 1934 (E). — Reported by Groh as an occasional escape.

Melilotus alba Desf. — Reported by Groh as a common escape throughout most of the agricultural districts. It is more frequent than the next.

Melilotus officinalis Lam. — Reported by Groh as a common escape throughout most of the agricultural districts.

Trifolium repens L. — Reported by Groh as an escape, common to abundant throughout the agricultural districts.

Trifolium hybridum L. — Reported by Groh as an abundant escape throughout the agricultural districts. He states that "... the alsike clover evidently [is] better at home than the others, and the red clover least so."

Trifolium pratense L. — Reported by Groh as an escape throughout most of the region.

Caragana arborescens Lam. — Roadside ditch, seeded from nearby hedge, High Prairie, Alta., *Groh*, no. 1055 (E, G).

Astragalus canadensis L. — Woods, Bear Flat, B. C., *Groh*, no. 818 (E, G).

Astragalus lineare (Rydb.) A. E. Porsild. — See Rhod. **41**: 250-51 (1939). — Lesser Slave L. district, *Brinkman*, no. 4073 (Br.).

Oxytropis retrorsa Fern. — See Rhod. **30**: 140-41 (1928). — Grande Prairie, Alta., *Miss J. Bostock*, Aug. 1926 (E); railway, Hines Creek, Alta., *Groh*, no. 995 (E).

Oxytropis Paysoniana A. Nels. — Specimens cited in the Catalogue under *O. saximontana* A. Nels. (*Raup & Abbe*, nos. 3844, 3980) should be referred to this species.

Hedysarum alpinum L. var. **grandiflorum** Rollins. — See Rhod. **42**: 217-39 (1940). — Specimens noted in the Catalogue under *H. alpinum* (*Raup & Abbe*, nos. 3967, 4091) should be referred to this variety.

Hedysarum boreale Nutt. — See Rhod. **42**: 217-39 (1940). — Dry hills, Hudson Hope, B. C., *Groh*, no. 802 (E, G).

Vicia americana Muhl. var. **angustifolia** Nees. — Dry slope, Peace River, Alta., *Moss*, no. 6094 (UA, G).

Lathyrus ochroleucus Hook. — Dawson Creek, B. C., *Groh*, Sept. 3, 1934 (E); dry soil, Bear Flat, B. C., *Proctor*, May 30, 1935, no. 10197 (B); Beaverlodge district, Alta., *Stacey*, 1926; dry hills, Hudson Hope, B. C., *Groh*, no. 801 (E, G); aspen woods,

Brownvale, Alta., *Groh*, no. 1003 (E, G). — Reported by Groh as common and widespread. Noted in the *Catalogue* only as an unverified record by John Macoun between Lesser Slave L. and Hudson Hope.

GERANIACEAE

Geranium nemorale Suksd. var. *Bicknellii* (Britton) Fern. — See Rhod. 43: 35–6 (1941). — Specimens cited in the *Catalogue* under *G. Bicknellii* should all be referred here. Groh reports the species as widespread, especially in recently burned areas.

LINACEAE

Linum usitatissimum L. — Beaverlodge, *Groh*, Aug. 29, 1934 (E). — Reported by Groh as “Sparingly escaped in the Peace River parts particularly.”

POLYGALACEAE

Polygala Senega L. — Dry open meadow near railroad, Blue Sky, Alta., *Mrs. Henry*, no. 666 (G, P); Peace River Block, B. C., *J. Travis*, 1930 (B).

EUPHORBIACEAE

Euphorbia glyptosperma Engelm. — Railway yards, Berwyn, Alta., *Groh*, no. 1021 (E, G).

Euphorbia serpyllifolia Pers. — Railway gravel, Peace River, Alta., *Groh*, Sept. 12, 1934 (E).

CALLITRICHACEAE

Callitriche hermaphrodita L. — See Rhod. 25: 211 (1923), and Vierteljahrssch. Nat. Ges. Zür. 53⁴: 548 (1909). — Dease R., B. C., *Mrs. Henry*, no. 962 (P).

ACERACEAE

Acer Negundo L. — Groh states that it has been “seen a few times where introduced by planting, and tending to multiply.”

BALSAMINACEAE

Impatiens biflora Walt. — Specimens collected by Graham in the Peace River Block, B. C. (nos. 448, 509, BU) are probably referable to this species, although more well-collected specimens are needed before its correct status, as well as that of *I. Nolitangere*, can be defined. Brinkman reports *I. biflora* in the Lesser Slave L. district (no. 3920), but the writer has not seen his material.

MALVACEAE

Malva neglecta Wallr. — *M. rotundifolia* of Am. auth. — See Rhod. 39: 98–9 (1937). — Athabaska, Alta., *Groh*, July 3, 1935 (E). — Groh states that he has seen it only at Athabaska.

GUTTIFERAE

Hypericum majus (Gray) Britton. — Lake shore, Grouard, Alta., *Groh*, no. 1068 (E, G).

VIOLACEAE

Viola arvensis Murr. — Fields and gardens, Beaverlodge, Alta., *Groh*, Aug. 28, 29, 1934 (E); no. 687 (E, G). — Groh states that in a garden at Beaverlodge, “. . . a colony of plants exhibited every degree of variation between this and *V. tricolor* L., suggesting that the whole stock may have been derived from reversion of the garden pansy.”

CACTACEAE

Opuntia fragilis (Nutt.) Haw. — Specimens cited in the *Catalogue* under *O. polyantha* belong here.

ELAEOAGNACEAE

Elaeagnus commutata Bernh. — Specimens cited in the *Catalogue* under *E. argentea* (Pursh, not Moench) should bear this name.

ONAGRACEAE

Epilobium densum Raf. — Wetter parts of muskeg, near lake, Smith, Alta., *Moss*, no. 6300 (UA, G); depression with willows and tall grass near Slave Lake, Alta., *Moss*, no. 6055 (UA, G).

Epilobium palustre L. var. **monticola** Haussk. — Muskeg, Dixonville, N. of Grimshaw, Alta., *Moss*, no. 6152 (UA). — Previously collected only in the mountains.

Oenothera strigosa (Rydb.) Mack. & Bush. — Railway, Grande Prairie, Alta., *Groh*, no. 865 (E, G). — *Groh* records "*Oenothera* sp." as fairly common in the Athabaska district and occasionally farther west. More collections will be necessary before it will be known whether more than one species are involved.

HALORRHAGACEAE

Myriophyllum exallescens Fern. — *M. spicatum* of auth. — See *Rhod.* **21**: 120 (1919). — Slough W. of Turnagain R., B. C., alt. 2100', *Mrs. Henry*, no. 929 (G, P); Blue L., B. C., *Mrs. Henry*, no. 795 (P); near mouth of stream on sandy lake shore, Faust, Lesser Slave L., *Moss*, no. 6201 (UA). — Reported by Graham (as *M. spicatum*) in the Peace River Block, B. C.

UMBELLIFERAE

Cicuta occidentalis Greene. — Rose Prairie, B. C., *Groh*, Sept. 6, 1934 (E); alkaline slough, Bear L., near Grande Prairie, Alta., *Groh*, no. 898 (E); dried slough along Halfway R., near the Peace, at Farrell, B. C., *Groh*, no. 721 (E); wet runway in prairie, Notikewin, *Moss*, no. 6190 (UA, G). — John Macoun's record of *C. maculata* between Lesser Slave L. and Hudson Hope in 1872 probably refers to this species.

Cicuta bulbifera L. — Wet ground by railway, W. of McLennan, Alta., *Groh*, Sept. 14, 1934 (E). — *Groh* mentions only this one locality.

Carum Carui L. — Railway, McLennan, Alta., *Groh*, no. 1038 (E). — *Groh* reports it as rather widespread in the agricultural districts, but not common.

Zizia aptera (Gray) Fern. — *Z. cordata* of auth. — See *Rhod.* **41**: 441-4 (1939). — Specimens noted in the *Catalogue* under *Z. cordata* should be referred here; also specimens collected by *Groh* at Brownvale, Alta. (no. 1002, E) and Rolla, B. C. (no. 834, E, G); and by *J. Travis* in the Peace River Block, B. C., 1930 (B).

THASPIUM AUREUM Nutt. — Reported by Graham in the Peace River Block, B. C.

Lomatium foeniculaceum (Nutt.) Coult. & Rose. — See *Ann. Mo. Bot. Gard.* **25**: 259-60 (1938). — Dry sunny bank of Peace R., Fort St. John, B. C., *Mrs. Henry*, no. 671 (G, P); hillside at Bear Flat, Peace R., B. C., *M. Proctor*, May 19, 1935, no. 10177 (B).

Anethum graveolens L. — *Groh* states that this was "found on dry slope at Peace River, Alta., apparently an escape from cultivation."

OENANTHE SARMENTOSA Presl. — Reported by Graham in the Peace River Block, B. C.

Pastinaca sativa L. — *Groh* states that this species is naturalized mostly in the western half of the agricultural region.

CORNACEAE

Cornus stolonifera Michx. var. **Baileyi** (Coult. & Evans) Drescher. — This was erroneously indicated in the *Catalogue* as a new combination. See *Trans. Mich. Acad. Sci. Arts & Letters* **23**: 190 (1933).

PYROLACEAE

Pyrola secunda L. — Sandy tract at Hudson Hope, B. C., *Groh*, no. 784 (E); dry pine woods, Peace River, Alta., *Moss*, no. 6125 (UA). — Noted in the *Catalogue* only from the mountains.

Pyrola asarifolia Michx. — Poplar woods, Hudson Hope, B. C., *Groh*, no. 804 (E, G); dry pine woods, Peace River, Alta., *Moss*, no. 6124 (UA, G). — This typical form of the species noted in the *Catalogue* only from the mountains.

Monotropa uniflora L. — Aspen-poplar woods, Faust, Lesser Slave L., *Moss*, no. 6217 (UA).

ERICACEAE

Ledum palustre L. var. **decumbens** Ait. — Mountain near Laurier Pass, B. C., alt. 4400', *Mrs. Henry*, no. 511 (P).

Arctostaphylos Uva-ursi (L.) Spreng. — Dry stony soil, Ft. St. John, B. C., *Mrs. Henry*, no. 677 (G, P); dry hills, Hudson Hope, B. C., *Groh*, no. 805 (E, G); railway embankment, McLennan, Alta., *Groh*, no. 1039 (E). — Noted in *Catalogue* only on reports of Macoun and Raup. Common.

Vaccinium uliginosum L. — When the *Catalogue* was prepared this species was known in our region from a single specimen collected by Dawson on the Frances R. The following material collected by *Mrs. Henry* is therefore worthy of note: S. E. slope of mountain near Akie Pass, B. C., alt. 5000', no. 579 (P); Akie Pass, B. C., alt. 4600', no. 560 (P); clay bank, E. of Gunderhoo Pass, B. C., alt. 4700', no. 903 (G, P); Dease L., B. C., alt. 2500', no. 956 (G, P).

PRIMULACEAE

Primula egaliksensis Wormsk. f. **violacea** Fern. — See *Rhod.* **30**: 59 (1928). — In moss near stream, Caribou Pass, B. C., alt. 5500', *Mrs. Henry*, no. 738 (G, P).

GENTIANACEAE

Halenia deflexa (Smith) Griseb. — Noted in the *Catalogue* from a single collection on the Henry R., B. C. (*Mrs. Henry*, no. 174). Brinkman reports a specimen (no. 4004) from the Lesser Slave L. district, but it has not been seen by the writer.

POLEMONIACEAE

Polemonium occidentale Greene. — Low ground, Notikewin, Alta., *Moss*, no. 2244 (UA); swampy ground at roadside, Dixonville, N. of Grimshaw, Alta., *Moss*, no. 6146 (UA, G).

Polemonium lanatum Pall. var. **humile** (Willd.) Brand. — A specimen collected by *Mrs. Henry* at Cypress Pass, B. C., alt. 4000', no. 700 (G, P) is probably referable to this species.

Polemonium rotatum Eastwood. — Mountain near Laurier Pass, B. C., alt. 5400', *Mrs. Henry*, no. 645 (P); Laurier Pass, B. C., alt. 4600', *Mrs. Henry*, no. 648 (P). — Both of these specimens are placed in this species tentatively. Dr. E. T. Wherry states (personal communication) that a habit photograph made by *Mrs. Henry* and attached to one of the above sheets shows rotate-campanulate corollas, and so does not agree entirely with the original description of *P. rotatum*.

HYDROPHYLLACEAE

Phacelia tanacetifolia Benth. — Montney, B. C., *Groh*, Sept. 5, 1934 (E). — Also reported by *Groh* at Baldonnel, B. C., and both regarded as garden escapes.

BORAGINACEAE

Lappula echinata Gil. — Peace River district, B. C., *Miss Bertrand*, 1933, no. 9422 (B); Peace River, Alta., *Groh*, Sept. 12, 1934 (E); railway, Spirit River, Alta., *Groh*, no. 943 (E). — Reported by *Groh* as a rather common weed along railways and in fields throughout most of the agricultural districts.

Hackelia deflexa (L.) Opiz. — Dry roadside, Hudson Hope, B. C., *Groh*, no. 810 (E, G); open woods, Taylor Flat, B. C., *Groh*, no. 830 (E).

LABIATAE

Agastache Foeniculum (Pursh) Ktze. — Moist fields, Peace River, Alta., *Miss J. Bostock*, Aug. 1926 (E); roadside, Peace River, Alta., *Groh*, no. 1023 (E, G). — Noted in the *Catalogue* on reports by John Macoun between Lesser Slave L. and Hudson Hope in 1872, and by Dawson at Dunvegan in 1879.

Stachys palustris L. subsp. **pilosa** (Nutt.) Epling. — See *Fedde Rep. Spec. Nov. Beihfte* **80**: 63 (1934). — Material cited in the *Catalogue* under *S. scopulorum* should bear this name.

SOLANACEAE

Solanum nigrum L. — Reported by Groh in gardens and fields at Beaverlodge, Alta., and Taylor, B. C., Sept. 1934.

Solanum triflorum Nutt. — Field, at Taylor, B. C., *Groh*, no. 824 (E). — Also reported by Groh at Taylor in 1934, "in fields with crops."

SCROPHULARIACEAE

Linaria vulgaris Hill. — Clyde, Alta., *Groh*, July 4, 1935 (E); railway yards, Berwyn, Alta., *Groh*, no. 1020 (E).

Linaria minor (L.) Desf. — Railway, Rochefort Bridge, Alta., *Groh*, no. 1082 (E, G).

Linaria reticulata Desf. — Escaped from gardens at Fort St. John, B. C., *Groh*, Sept. 7, 1934 (E), and at Beaverlodge, Alta., *Groh*, Aug. 29, 1934 (E). — This is the *L. macrocana* of Groh's list.

Penstemon procerus Dougl. — Edge of field, Beaverlodge, Alta., *Groh*, no. 851 (G); Peace River Block, B. C., *Graham*, no. 136 (BU) (*P. confertus* var. *caeruleo-purpureus* of Graham's list). — Noted in the *Catalogue* only from specimens collected on the upper Halfway R.

Penstemon Gormanii Greene. — Turnagain R., B. C., *Mrs. Henry*, no. 938 (G, P); Sand Cr., B. C., *Mrs. Henry*, nos. 953, 971, 972 (G, P).

Limosella aquatica L. — Stream bank, Grande Prairie, Alta., *Groh*, no. 916 (E).

Veronica alpina L. var. *unalaschensis* Cham. & Schl. — Specimens collected by E. C. Abbe and the writer on Mt. Selwyn, and probably the others cited in the *Catalogue* under *V. Wormskjoldii* should bear this name. — See Fernald in Rhod. 41: 447-57 (1939) for a recent revision of the group.

VERONICA ANAGALLIS-AQUATICA L. — Reported by Graham in the Peace River Block, B. C.

Veronica persica Poir. — *V. Tournefortii* of auth. — See Acad. Nat. Sci. Phila. Monog. 1: 349 (1935). — Garden at Beaverlodge, Alta., *Groh*, Aug. 29, 1934 (E).

Castilleja fulva Pennell. — See Proc. Acad. Nat. Sci. Phila. 86: 540 (1934). — The following specimens, cited in the *Catalogue*, should be referred to this species: *Mrs. Henry*, nos. 230, 231; *Raup & Abbe*, nos. 3602, 3944. No. 3602 is the type of the species. Further specimens, not cited in the *Catalogue*, are: Christine Falls, Graham R., B. C., alt. 3000', *Mrs. Henry*, no. 465 (P); Graham R., B. C., alt. 4000', *Mrs. Henry*, nos. 496, 502 (P).

Castilleja Henryi Pennell. — See Proc. Acad. Nat. Sci. Phila. 86: 534-5 (1934). — Mountain at head of Besa R., B. C., alt. 5500', *Mrs. Henry*, no. 303 (P, G) (cited in *Catalogue*); mountain E. of Laurier Pass, B. C., alt. 5500', *Mrs. Henry*, no. 709 (G, P). No. 303 is the type of this species.

Castilleja Raupii Pennell subsp. *typica* Pennell. — See Proc. Acad. Nat. Sci. Phil. 86: 528-30 (1934). — White Mud R., Alta., *J. M. Macoun*, no. 61256 (G, N, O); Toad R., B. C., alt. 4200', *Mrs. Henry*, no. 120 (P); N. of Grimshaw, Alta., *Moss*, no. 2242a (P); Notikewin, Alta., *Moss*, no. 2242b (P); muskeg, Dixonville, N. of Grimshaw, Alta., *Moss*, no. 6144 (UA, G).

Euphrasia subarctica Raup. — Musqua R., B. C., *Mrs. Henry*, no. 790 (G, P).

Rhinanthus Kyrollae Chab. — Wet meadow, Beaverlodge, Alta., *Groh*, Aug. 30, 1934 (E); Bear Flat, B. C., *Freer*, July 31, 1935, no. 10133 (B); open woods, Notikewin, *Moss*, no. 2257 (UA); dry ground, roadside, Dixonville, N. of Grimshaw, Alta., *Moss*, no. 6148 (UA, G); Peace River Block, B. C., *Graham*, no. 572 (BU) (*R. Crista-galli* of Graham's list). — Noted by Groh as rather common in the western parts of the agricultural district. John Macoun's record of *R. minor* between Lesser Slave L. and Hudson Hope in 1872 may belong here.

Pedicularis labradorica Wirsing, not Houlttuyn. — See Rhod. 40: 292 (1938). — Note change of authority.

Pedicularis Langsdorffii Fisch. — Mountain in Caribou Pass, B. C., alt. 6500', *Mrs. Henry*, no. 615 (P).

PLANTAGINACEAE

Plantago major L. — Dry roadsides, Hudson Hope, B. C., *Groh*, nos. 729 (E), 733 (E, G); railway yards, Beaverlodge, Alta., *Groh*, no. 663 (E, G). — Many or all of Groh's records for *P. major* var. *asiatica* are probably referable to the typical species. He reports the variety as abundant and widespread as a weed throughout the agricultural districts.

Plantago lanceolata L. — Barnyard, at Rose Prairie, B. C., *Groh*, Sept. 6, 1934 (E). — Also reported by Groh at North Pine.

RUBIACEAE

Galium aparine L. — Athabaska, Alta., *Groh*, July 3, 1935 (E).

CAPRIFOLIACEAE

Viburnum edule (Michx.) Raf. — Material cited in the *Catalogue* as *V. pauciflorum* Raf. should bear this name. See Fernald in Rhod. **43**: 481-3 (1941).

Symphoricarpos albus (L.) Blake. — In a recent monograph (Jour. Arn. Arb. **21**: 201-52, 1940) Jones has not maintained the var. *pauciflorus* under which the Peace River plants were cited in the *Catalogue*. It is noteworthy that the writer has recently seen a specimen collected at Bear Flat, B. C., by Percy Freer (June 18, 1935, no. 10140 (B)) which closely matches the typical species as represented in the Gray Herbarium.

Lonicera involucrata Banks. — Noted in the *Catalogue* only from the mountains, but reported by Brinkman (no. 3912) in the Lesser Slave L. district. The writer has not seen this material, but he has collected the species at Lac la Biche to the eastward.

Lonicera notha Zab. (*L. Ruprechtiana* × *L. tartarica*). — Garden escape in dry ground, Hudson Hope, B. C., *Groh*, no. 813 (A, E).

CUCURBITACEAE

Echinocystis lobata T. & G. — Reported by Groh at Peace River, High Prairie, and in the Athabaska district, Alta.

CAMPANULACEAE

Campanula aurita Greene. — Specimens cited in the *Catalogue* under *C. rotundifolia* var. *alaskana* should be referred to this species. Another specimen was collected by Mrs. Henry in 1935: stony slide on a mountainside near St. Paul's Mt., B. C., alt. 6500', no. 897 (part) (P).

COMPOSITAE

Grindelia perennis A. Nels. — See Ann. Mo. Bot. Gard. **21**: 485 (1934). — Material cited in the *Catalogue* under *G. squarrosa* belongs here, as well as specimens collected by Groh at Beaverlodge, Alta., no. 665 (E, G). Noted by Groh as rather widespread throughout the agricultural districts.

Solidago decumbens Greene var. *oreophila* (Rydb.) Fern. — See Rhod. **38**: 202-4 (1936). — Following Prof. M. L. Fernald's recent revision of this group, at least a part of the material cited in the *Catalogue* under *S. decumbens* (Raupe & Abbe, nos. 3858, 4251) should be placed here. Likewise, the specimens cited under *S. oreophila* (Brinkman, no. 4511; Mrs. Henry, no. 84).

Aster angustus (Lindl.) T. & G. — Peace River, Alta., *Groh*, Sept. 12, 1934 (E); railway, Hines Creek, Alta., *Groh*, no. 998 (E); railway, McClennan, Alta., *Groh*, no. 992 (E, G).

Aster sibiricus L. — Material cited in the *Catalogue* under *A. Richardsonii* should bear this name. See Forsild, Rhod. **41**: 291; Scamman, Rhod. **42**: 339; Hultén, Fl. Kamtch. **4**: 157-8, and Fl. Aleut. Isl. 317-18.

Erigeron angulosus Gaudin var. *kamtschaticus* (DC.) Hara. — *E. elongatus* Ledeb. — See Rhod. **40**: 346 (1938) and **41**: 388-390 (1939). — Material cited in the *Catalogue* under *E. acris* var. *asteriodes* should bear the above name.

Erigeron elatus Greene. — See Rhod. **40**: 344-47 (1938). — Specimens cited in the *Catalogue* under *E. acris* var. *arcuans* belong here.

Erigeron jucundus Greene. — Material cited in the *Catalogue* under *E. acris* L. var. *debilis* should bear this name.

Erigeron caespitosus Nutt. — Two of Mrs. Henry's numbers (143, 181), cited in the *Catalogue* under *E. glabellus*, should be referred to this species.

Erigeron canadensis L. — Noted by Groh as common and widespread in the agricultural districts, "on cultivated and pasture fields on the lighter type of soil."

Antennaria atriceps Fern. — Previously known only from the type locality on Mt. Selwyn (*Raup & Abbe*, no. 4134). Excellent additional material was collected by Mrs. Henry on a mountain E. of Laurier Pass, B. C., alt. 5800', no. 715 (G, P).

Antennaria aprica Greene. — Material cited in the *Catalogue* under *A. parvifolia* Nutt. should be referred to this species. Additional specimens were collected by Mrs. Henry in 1935, extending the known range westward into the foothills: Cache Cr., B. C., no. 680 (G, P); S. fork of Halfway R., B. C., alt. 4200', no. 727 (G, P).

Iva axillaris Pursh. — Alkaline soil, Bear L., near Grande Prairie, Alta., *Groh*, no. 892 (E, G); dry field, Lower Beaverlodge, Alta., *Groh*, no. 841 (E, G); roadside north of Kleskun Lake bottom, near Grande Prairie, Alta., *Groh*, no. 901 (E, G).

Iva xanthifolia Nutt. — Dry land, Beaverlodge, Alta., *Groh*, no. 683 (E); railway, McLennan, Alta., *Groh*, no. 990 (E, G); railway, Wanham, Alta., *Groh*, no. 985 (E, G).

Ambrosia artemisiifolia L. — McLennan, Alta., *Groh*, Sept. 14, 1934 (E).

Ambrosia trifida L. — Railway yards, Spirit River, Alta., *Groh*, no. 925 (E, G). — Occasional in the agricultural districts, according to Groh, as far west as Pouce Coupé, B. C.

Helianthus annuus L. — Hythe, Alta., *Groh*, Aug. 31, 1934 (E); Pouce Coupé, B. C., *Groh*, Sept. 1, 1934 (E).

Helianthus giganteus L. — Railway yards, Spirit River, Alta., *Groh*, nos. 927 (E), 928 (E, G); roadside, High Prairie, Alta., *Moss*, no. 2404 (UA).

Madia glomerata Hook. — Ditch along railway, McLennan, Alta., *Groh*, no. 1052 (E, G).

Gaillardia aristata Pursh. — Athabaska, Alta., *Groh*, July 3, 1935 (E); railway yards, Berwyn, Alta., *Groh*, no. 1017 (E).

Anthemis Cotula DC. — Yard at Hudson Hope, B. C., *Groh*, no. 814 (E, G); railway yards, Spirit River, Alta., *Groh*, no. 926 (G).

Anthemis tinctoria L. — Garden escape, McLennan, Alta., *Groh*, Sept. 13, 1934 (E).

Achillea Ptarmica L. — Roadside ditch, escape from planting, High Prairie, Alta., *Groh*, no. 1060 (E, G).

Matricaria matricarioides (Less.) Porter. — Included in the *Catalogue* on the basis of an early record (1875) by John Macoun at Hudson Hope. Groh lists it as abundant and widespread throughout the agricultural districts, and Graham also notes it in the Peace River Block.

Matricaria maritima L. var. *agrestis* (Knaf.) Wilmott. — *M. inodora* of auth. — Groh states that this species has been "Seven times noticed from McLennan westward to the Peace River Block."

Chrysanthemum Leucanthemum L. var. *pinnatifidum* Lecoq & Lamotte. — Hythe, Alta., *Groh*, Aug. 31, 1934 (E); railway at Greencourt, Alta., *Groh*, no. 1084 (E). — Brinkman's record of *C. Leucanthemum* (no. 4649) in the Lesser Slave L. district probably belongs here.

Artemisia dracunculoides Pursh. — Peace River, Alta., *Groh*, Sept. 12, 1934 (E), and nos. 1033, 1034 (E); dry slope of river valley, Peace River, Alta., *Moss*, no. 6087 (UA, G); Rose Prairie, B. C., *Groh*, Sept. 6, 1934 (E); railway yards, Beaverlodge, Alta., *Groh*, no. 664 (E, G). — Noted by John Macoun between Lesser Slave L. and Hudson Hope in 1872.

Artemisia caudata Michx. — Roadsides and railways, Spirit River, Alta., *Groh*, nos. 939, 961 (E, G).

Artemisia borealis Pall. — See Rhod. 29: 93-5 (1927). — Moist sandy river bar,

Musqua R., B. C., *Mrs. Henry*, no. 785 (G, P). — This species was represented in the *Catalogue* only by its variety *Purshii* Bess.

Artemisia Absinthium L. — Roadside, Grande Prairie, Alta., *Groh*, no. 911 (E, G). — Apparently occasional in the agricultural districts. Reported by Brinkman (no. 3875) in the Lesser Slave L. district.

Artemisia biennis Willd. — Swale E. of Beaverlodge, Alta., *Groh*, Aug. 30, 1934 (E); Peace River, Alta., *Miss Bostock*, Aug. 1926 (E). — Noted by Groh as abundant and widespread throughout the agricultural districts. Reported by John Macoun between Lesser Slave L. and Hudson Hope in 1872.

Artemisia arctica Less. — Material cited in the *Catalogue* as *A. norvegica* should be referred to this species. See Hultén, *Fl. Kamtchatka* 4: 176–80 (1930) for a discussion of *A. arctica* and its relationships.

Artemisia ludoviciana Nutt. — Peace River, Alta., *Groh*, Sept. 12, 1934 (E); dry bank, Grande Prairie, Alta., *Groh*, no. 872 (E, G). — Reported by John Macoun between Lesser Slave L. and Hudson Hope in 1872. Groh notes it as common throughout most of the agricultural districts.

Artemisia Abrotanum L. — Dry bank, Grande Prairie, Alta., *Groh*, no. 873 (E).

Arnica obtusifolia Less. var. *acuta* Raup. — Previously known only from the type collection in a pass N.E. of Robb L., B. C. (*Mrs. Henry*, no. 279). Additional material was collected by *Mrs. Henry* in 1935, on a mountain near Besa R., B. C., no. 751-a (G, P); and in 1933 on a mountain near the Akie R., B. C., alt. 5000', no. 580 (P).

Senecio vulgaris L. — Garden at Grande Prairie, Alta., *Groh*, no. 888 (E, G). — Noted by Groh as "occasional from the Grande Prairie district eastward."

Senecio palustris (L.) Hook. — Lake shore, McLennan, Alta., *Groh*, no. 1045 (E, G).

Senecio Purshianus Nutt. — Reported by Brinkman in the Lesser Slave L. district (no. 4085).

Cirsium Drummondii T. & G. — Beaverlodge, Alta., *Groh*, Aug. 29, 1934 (E); dry poplar woods, Hudson Hope, B. C., *Groh*, no. 737 (E, G); prairie, Notikewin, Alta., *Moss*, no. 6165 (UA, G). — Noted in the *Catalogue* only from the mountains. It is reported by Groh as occurring chiefly in the western part of the agricultural district.

Cirsium arvense (L.) Scop. — By railway elevator, Hualan, Alta., *Groh*, no. 863 (E); yard, Spirit River, Alta., *Groh*, no. 924 (E). — Groh states that this species is now widely distributed in the agricultural districts, though but recently introduced.

Crepis tectorum L. — Clyde, Alta., *Groh*, July 4, 1935 (E); railway, Spirit River, Alta., *Groh*, no. 967 (E); railway, Beaverlodge, Alta., *Groh*, no. 882 (E); roadside, Hudson Hope, B. C., *Groh*, no. 815 (E, G).

Crepis virens L. — Reported by Graham in the Peace River Block, B. C.

Taraxacum officinale Weber. — White soil of parkland, South Wapiti, Alta., *Groh*, no. 689 (E). — Reported by Groh as common and widespread in the agricultural districts. Mr. Groh also states that a "fair proportion" of the common dandelions of the region belong to *T. laevigatum*; but in the absence of specimens, especially since *T. laevigatum* as recently interpreted by Prof. Fernald is a somewhat more southern species (*Rhod.* 35: 379–80), these records had best be left tentative.

Lactuca biennis (Moench) Fern. — *L. spicata* of auth. — See *Rhod.* 42: 300–302 (1940). — Lesser Slave L. district, *Brinkman*, nos. 4036, 4479 (Br).

Lactuca scariola L. f. *integrifolia* (Bogenh.) G. Beck. — Peace River, Alta., *Groh*, Sept. 13, 1934 (E); denuded bench of river valley, Peace River, Alta., *Moss*, no. 6137 (UA, G); roadside, Spirit River, Alta., *Groh*, no. 940 (E, G). — Plants cited by Groh under *L. scariola* belong to this form.

Prenanthes racemosa Michx. — Pouce Coupé, B. C., *Sgt. Greenwood*, Aug. 1932, no. 9223 (B); prairie at North Star, near Notikewin, Alta., *Moss*, no. 2274 (UA); prairie, Notikewin, *Moss*, no. 6163 (UA, G); burned poplar area, Hythe, Alta., *Moss*, no. 2326 (UA).

Sonchus arvensis L. — Fahler, Alta., *Groh*, Sept. 14, 1934 (E); roadside, Grouard, Alta., *Groh*, no. 1063 (E). — Apparently occasional in our region, and principally represented, according to Groh, by the following variety.

Sonchus arvensis L. var. **glabrescens** Guenth., Wimm. & Grab. — See Rhod. **12**: 145 (1910); **30**: 19 (1928). — Railway yards, Spirit River, Alta., *Groh*, no. 930 (E); railway, Grande Prairie, Alta., *Groh*, no. 866 (E). — Groh states that this variety is rather common and widespread in the agricultural districts.

Sonchus asper (L.) Hill. — Baldonnel, B. C., *Groh*, Sept. 5, 1934 (E). — Noted by Groh "in the Athabaska, Peace River and Fort St. John regions."

Sonchus oleraceus L. — Garden, at Beaverlodge, Alta., *Groh*, no. 837 (E). — Reported by Groh from this single locality.

Tragopogon major Jacq. — Beaverlodge, Alta., *Groh*, Aug. 29, 1934 (E); railway, Wembley, Alta., *Groh*, no. 885 (E). — At least a part of the plants cited by Groh from Beaverlodge under *T. pratensis* belong to this species.

Tragopogon pratensis L. — Railway yards, Dawson Creek, B. C., *Groh*, no. 832 (E, G). — Previously reported by *Brinkman* (no. 4084) in the Lesser Slave L. district.

ARNOLD ARBORETUM,
HARVARD UNIVERSITY.

ON CERTAIN EUPHORBIACEAE FROM THE TROPICAL FAR EAST

LEON CROIZAT

IN the present paper new species and combinations are included together with new records and general critical notes pertaining to representatives of the following genera: *Actephila* Bl., *Phyllanthus* L., *Securinega* A. L. Juss., *Dicoelia* Benth., *Cleistanthus* Hook. f., *Croton* L., *Alchornea* Sw., *Macaranga* Thouars, *Epiprinus* Griff. and *Trigonostemon* Bl.

As a result of the study of the limits of certain controversial groups the following changes are introduced: (1) *Ptychopyxis* Miq. is made to include *Calpigyne* Bl. and *Podadenia* Thw.; (2) *Phyllanthodendron* Hemsl., treated as a section of *Phyllanthus* by many authors, is reestablished as of generic rank; (3) *Coelodepas* Hassk. is used as a *nomen genericum conservandum* and its range is extended to China and Indo-China; (4) *Paracleisthus* Gagnep. and *Nephrostylus* Gagnep. are reduced to *Cleistanthus* and *Coelodepas* respectively; (5) *Symphyllia* Baill. is reduced to *Epiprinus* Griff.; (6) *Phyllanthus* L. sect. *Eriococcus* Muell.-Arg. is raised to subgeneric rank. Various new species are proposed and new combinations made in the genera mentioned. This study is based on material in the herbarium of the Arnold Arboretum of Harvard University.

***Actephila* Blume**

Actephila longipedicellata (Merr.) comb. nov.

Cleistanthus longipedicellatus Merr. Univ. Calif. Publ. Bot. **10**: 425. 1924.

Apparently a good species, endemic to W. Tonkin, belonging to *Actephila*, having the long-pedicelled and porrected ♀ flowers of numerous species of this genus. Its foliage strongly suggests that of *Erismanthus* Wall., with which it may easily be confused whenever sterile. *Actephila excelsa* Muell. Arg., from India, has much stouter pedicels in fruit. *Actephila subsessilis* Gagnep. has differently shaped leaves and different perianths.

Actephila Merrilliana Chun, Sunyatsenia **3**: 26. 1935.

Actephila inopinata Croiz. Jour. Arnold Arb. **21**: 490. 1940, Syn. nov.

The original description was based on cultivated specimens originating in Hainan but grown in Canton. When publishing my new species, I relied upon Chun's description and illustration, not realizing that numerous collections of *A. Merrilliana* had been erroneously determined and filed as representative of *Dimorphocalyx Poilanei* Gagnep. These collections, all from Hainan, are as follows: *Lau* 276, 1118, *Chun & Tso* 44524, *Liang* 62134, *How* 70707, 70916, 73826, *Wang* 33012, 34919. *Actephila* and *Dimorphocalyx*, although totally unrelated, are easily confused in a sight-determination, as they differ chiefly in floral characters.

The original description of *A. Merrilliana* Chun stresses the puberulent young shoots and branchlets. The material now available shows that the pubescence is sparse and not very persistent in plants grown under natural conditions. Thus the form which I have called *A. inopinata* may require trinomial recognition in a final revision of the group, although for the present it is placed as a straight synonym of Chun's species.

***Actephila dolichantha* sp. nov.**

Frutex vel arbuscula ad 2 m. altus, cortice pallido, innovationibus ut adest glabratus. Foliis 10–4 cm. longis, 3–1 cm. latis, discoloribus, supra olivaceis, subtus pallide brunneis, oblanceolatis, chartaceis, integerrimis, apice brevius acuminatis, basi longissime cuneatis, venis obscuris, utrinque ca. 8-jugis, adscendentibus; petiolo ca. 1 cm. longo, stipulis petiolaribus triangularibus coriaceis ad 2 mm. longis. Pedunculo fructifero subcapilliformi ad 5 cm. longo, hinc inde bracteolato, pedicello proprio ex articulatione suprema pedunculi 1 cm. longo clavato. Columella crassiuscula 4 mm. longa; coccis delapsis ad 2 cm. longis, endocarpio coriaceo-lignoso, exocarpio tenui, leviusculo, toto secedibili; semine submaturo figura grosse pentagono, 10 mm. lato, 8 mm. longo, facie ventrali impresso incurvo, raphe conspicuo.

CHINA: Yunnan, Kuen-ger, Che-li Hsien, C. W. Wang 79253, October 1936, in mixed forest at 1000 m. alt.

The available material is poor, but the seed is that of an *Actephila*. The Indian *A. excelsa* Muell. Arg. is a very different plant, with much shorter and stouter fruiting pedicels; *A. subsessilis* Gagnep. and *A. longipedicellata* Croiz. have a very different foliage. This is apparently the first record of *Actephila* for continental China.

***Phyllanthus* Linnaeus**

***Phyllanthus Petelotii* sp. nov.**

Arbuscula vel frutex glaberrimus, lignosus. Foliis 1.5–1 cm. longis, 0.5–0.2 cm. latis, lanceolato-ellipticis vel ellipticis, firme chartaceis, margine vix revolutis, venis subobscuris adscendentibus ad 6-jugis; petiolulo brevissimo vix 0.75 mm. longo, stipulis late trigonis, infra interdum liberi, interdum apice setaceis, margine erosulis ad 2 mm. longis latisque. Floribus ♂ ignotis. Floribus ♀: pedicello rigido capillaceo ad 1 cm. longo; perianthii lobis 5 ad basem liberis, integerrimis, lineari-lanceolatis, secus medium costato-venosis, 1.25 mm. longis, 0.30 mm. latis. Ovario glaberrimo, sulcato, levissimo, vix 0.30 mm. magno; stylo erecto ca. 3 mm. longo, stigmatibus lentis ad 1 mm. partitis, subulatis, disco grosse glanduloso.

INDO-CHINA: Tonkin, Cascade d'Argent, Massif du Tam Dao, *Pételot* 5226, May 1931.

The foliage and the long-pedicelled flowers suggest *P. simplex* Retz., but this is a widely distributed annual or perennant weed, having a different floral structure. *Phyllanthus parvifolius* Buch.-Ham., which I am unable at present to extricate from *P. Roeperianus* Muell.-Arg., is probably near *P. Petelotii* as to true affinities, but it has different flowers and smaller leaves. The best diagnostic character of the new species is apparently the structure of the pistillate flower, the erect styles and somewhat effuse habit of the stigmas suggesting *P. flexuosus* Sieb. & Zucc. (*Glochidion flexuosum* Pax & Hoffm.) and species of *Securinega*.

Phyllanthus sinicus (Baill.) Muell. Arg. *Linnaea* **32**: 50. 1863.

Cicca sinica Baill. *Etud. Gén. Euphorb.* 618, *pl.* 24, *figs.* 28–33. 1858.

Phyllanthus nobilis α *genuinus* Muell. Arg. in DC. *Prodr.* **15**(2): 414. 1866, p.p.

As Hooker suspected (*Fl. Brit. Ind.* **5**: 305. 1887), Mueller's understanding of the species of this group is unsatisfactory. *Tsang 29583*, collected at the Taai Wong Mo Shan in Kwangtung, answers the characters of Baillon's *Cicca sinica* and is certainly different from *P. nobilis*, which is a plant from tropical America. *Ford 166*, cited by Forbes & Hemsley (*Jour. Linn. Soc. Bot.* **26**: 420. 1894) as "*Sauropus* ?", probably belongs here and seems to be the same as *Ford 144*, determined "*Sauropus* ?" in the Paris Herbarium. Hooker separates *P. indicus* Muell. Arg. from *P. cyanospermus* Muell. Arg. because the latter has larger flowers and fruits and seeds of a brilliant metallic blue. I fail to find a real difference between *Stocks, Law & C.* (Malabar and Concan, *P. indicus*) and *Thwaites 2155* (Ceylon, *P. cyanospermus*), the ripe seed measuring in both about 5 mm. *Tsang 29583*, on the other hand, has a seed fully 7 mm. long. This difference, coupled with less manifest characters in the perianth, suggests that the plant of China is not conspecific with that of India.

The authors who have dealt with *Cicca* L. either as a section or as a genus are quite unable to agree on its limits. Mueller Argoviensis (DC. *Prodr.* **15**(2): 413–418. 1866) and Pax & Hoffmann (*Engl. & Prantl Nat. Pflanzenfam.* 2nd edit. **19**(c): 62. 1931) treat as *Phyllanthus* sect. *Cicca* species which Gamble (*Fl. Pres. Madras* **2**: 1293. 1925) recognizes under *Prosorus* Dalz. Robinson uses *Cicca* (Phil. *Jour. Sc. Bot.* **4**: 87. 1909) for the sake of one species, *C. acida* (L.) Merr., which has a woody fruit with abortive cells, but rejects Kurz's (For. *Fl. Burma* **2**: 352. 1877) concept of the genus. These doubts and controversies show that the scope of *Cicca* and similar oligotypic or monotypic segregates from *Phyllanthus* is yet to be tested by a study that critically considers all the species of this vast genus.

Phyllanthus discofractus sp. nov.

Frutex videtur, apicibus pube crispula minuta sordide vel laete brunnea dissite indutis. Foliis 8–4.5 cm. longis, 3–1.5 cm. latis, habitu optime distichis, ellipticis vel triangulari-ellipticis, interdum subfalcatis, basi late rotundatis, tenuiter chartaceis, colore vario, adultioribus supra griseis, tenellis brunneo-vinosis, hinc inde subtus pube levi parcius adspersis vel glabratis, venis late patentibus utrinque ca. 6-jugis, tenuibus; petiolo vix 0.2–0.3 cm. longo, puberulo, stipulis petiolaribus late triangularibus, acutatis, integris ad 0.15 cm. longis. Floribus in cymulis axillaribus hermaphroditis congestis. Perianthio δ colore vinoso ad 0.4 cm. lato, optime 4-lobo, lobis 0.2 cm. longis, margine erosis; staminibus 4 subsessilibus; pedicello gracillimo capilliformi, habitu lento vel flexuoso, ad 0.5 mm. longo. Perianthio η : colore δ , ad 0.7 cm. lato, lobis 6 in serie duplici alternantibus, triangulari-ovatis, ad 0.35 cm. longis, 0.15 cm. latis, margine fimbriato-erosis, medio costatis; ovario primo intuitu eximie 6-gono, levi, glabro, ad 0.15 cm. magno, subdepresso, disco ad 0.25 cm. magno, urceolato, labio interno ad basem ovarii videtur aucto, margine subintegro vel repandulo, in partes 3 irregulares (quoad viso) lacerato-partito; stylis 6 applanatis,

habitu cornutis, apice haud involutis, vix 0.1 cm. longis; pedicello subclavato ad 1.1–1.5 cm. longo.

INDO-CHINA: Sai Wong Mo Shan (Sai Vong Mo Leng), a short distance south of the Kwangtung border, *Tsang* 30366, May-Dec., 1940.

The new species belongs to *Phyllanthus* subg. *Eriococcus* (Hassk.) Croiz. & Metc. (*Phyllanthus* sect. *Eriococcus* (Hassk.) Muell.-Arg. *Linnaea* **32**: 3. 1863). This subdivision has been treated as a genus by Baillon under *Eriococcus* Hassk., 1843 (*Etud. Gén. Euphorb.* 648. 1858) and by Gamble (*Fl. Pres. Madras* **2**: 1291–1293. 1925) under the later name, *Reidia* Wight, 1852. A strong case can be made for Baillon's and Gamble's interpretations, because the species of this affinity form a closely knit natural group and do not range beyond Asia and Australasia. Clearly, *Eriococcus* is worthy of at least subgeneric rank and in a general revision of *Phyllanthus* it probably will have to be treated as a genus.

Phyllanthus discofractus differs from *P. Roxburghii* Muell.-Arg. in its large ♂ flower with differently shaped lobes; from *P. elegans* Muell.-Arg. in its much less robust habit and the smaller size of all its parts; from *P. gomphocarpus* Hook. f. in its disc and lobes of the perianth; from *P. asteranthos* Croiz., *P. rubriflorus* Beille, and *P. Bodinieri* Rehd. in the foliage. *Phyllanthus ruber* (Lour.) Spreng. superficially resembles the new species but does not even belong in the same subdivision.

Securinea A. L. de Jussieu

Securinea Spirei (Gagnep.) comb. nov.

Flueggea Spirei Gagnep. in Lecomte, *Fl. Gén. Indo-Chine* **5**: 529, figs. 65, 66. 1927.

I have not seen authentic material and rely on the description and illustrations of Gagnepain for the new combination. As stated in a previous contribution (*Jour. Arnold Arb.* **21**: 491. 1940), I agree with Pax & Hoffmann in reducing *Flueggea* to *Securinea*. The entire alliance to which this genus belongs is in need of critical attention.

Phyllanthodendron Hemsley

The floral differences that separate *Phyllanthodendron* from *Phyllanthus* are at least as great as those which separate the latter genus from *Sauropus* Bl., *Andrachne* L., *Breynia* J. R. & G. Forst., *Securinea* A. L. de Juss., *Glochidion* J. R. & G. Forst., *Reverchonia* A. Gray and *Agyneia* L. Considering that the original description was carefully drawn up by Hemsley, with the support of excellent illustrations (Hook. *Ic.* **26**: pl. 2563–2564. 1898), we can understand only with difficulty why *Phyllanthodendron* came to be merged with *Phyllanthus* as a "section" even by authors who at first recognized it as a distinct genus, *Uranthera* (Pax & Hoffmann, *Pflanzenr.* **47** (iv. 147. iii): 95. 1911). Mueller-Argoviensis, in describing *Phyllanthus mirabilis*, the basynym of *Phyllanthodendron mirabile*, noticed (DC. *Prodr.* **15**(2): 356. 1866) that it was a "Species forma calycis valde peculiaris et glandulis subpetaloideis insignita, nulli congenerum similis."

The characters that separate *Phyllanthodendron* generically from *Phyllanthus* are: (1) the slender ligules that alternate with the calyx lobes;

(2) the absence of a true disc or glands in the flowers of both sexes; (3) the peculiarly elongate and nearly saccate lobes which Pax & Hoffmann in their description of *Uranthera* aptly characterize as "Sepala cochleato-concava . . . parte superiore in acumen lineare, patens exeuntia."; (4) the usually thick and undivided grooved styles; (5) the intangibles of flower, inflorescence and vegetative characters which have prompted various botanists to identify specimens of *Phyllanthodendron* as representing *Cleistanthus* or even *Glochidion*. A further character which probably has generic importance and requires a modification of the definition of the ovule's and seed's position in the Euphorbiaceae is found strongly marked in *Phyllanthodendron anthopotamicum* (Hand.-Mazz.) Croiz. In this species the chalaza is located on the face of the seed and at the side, not on an adaxial line perpendicular to the hilum. This arrangement is radically different from anything so far observed in the family. A structure of the same kind has probably also been seen by Craib & Hutchinson, who describe (Kew Bull. 279. 1910) the seeds of *P. album* as follows: "Semina irregulariter subtriquetra, dorso convexa, in utroque latere excavatione alternatim supra et infra auriformi." The "excavations" are the hilum and the chalaza, if I am not very much mistaken, for these organs in the seed of *P. anthopotamicum* are embedded in a grooved line somewhat resembling an: "excavatione alternatim supra et infra auriformi."

It is not easy to determine the position of *Phyllanthodendron* in the Engler & Prantl classification as elucidated by Pax & Hoffmann. Characters appear in this genus that bespeak affinities with *Actephila* and *Cleistanthus*, but these two genera are separated in that classification in a clean cut manner, which disregards the fact that *Savia* is very near *Cleistanthus*. There is not the slightest reason, moreover, why *Andrachne phyllanthoides* should be placed in *Savia* as *S. phyllanthoides* Pax & Hoffm. *Phyllanthodendron* probably links the *Glochidion* group with the *Cleistanthus* aggregate.

The material in our herbarium, although fairly representative, is not of the best, so that a key to the species based on it, while it might be plausible on paper, would in practice be of little value. There are three main groups which may be characterized under the following sections:

(1) **Phyllanthodendron** sect. **Euphyllanthodendron**, sect. nov.

Floribus minusculis, lobis perianthii longe acuminatis, in cymulis axillari-bus congestis, pedicellis brevibus vel subnullis.

Typus: *Phyllanthodendron ligulatum* (Beille) Croiz.

The clusters of young flowers can easily be confused with fascicles of bud-stipules, as shown, although not very clearly, by Beille (Lecomte, Fl. Gén. Indo-Chine 5: 595. fig. 72, 5. 1927).

(2) **Phyllanthodendron** sect. **Pseudoactephila**, sect. nov.

Floribus pro genere majusculis, lobis modice acuminato-cochleatis, pedicellis vulgo praesertim sub fructu bene elongatis.

Typus: *Phyllanthodendron roseum* Craib & Hutchinson.

The inflorescence, especially when in fruit, suggests *Actephila*, but the foliage is reminiscent of *Cleistanthus* or *Glochidion*.

(3) **Phyllanthodendron** sect. **Calophyllum**, sect. nov.

Foliis minoribus vix ultra 5 cm. longis, indumento proprio facile distinguatur, caeterum inter sectiones praevias medium tenet.

Typus: *Phyllanthodendron anthopotamicum* (Hand.-Mazz.) Croiz.

These three sections may be keyed as follows:

Leaves less than 6 cm. longSect. *Calophyllum*

Leaves more than 6 cm. long

Flowers minute, not over 1-1.5 mm. wide, crowded in short-pedicelled capitate inflorescencesSect. *Euphyllanthodendron*

Flowers large, 2 or more mm. wide, crowded in long-pedicelled capitate inflorescencesSect. *Pseudoactephila*

The specific epithets under *Phyllanthodendron* have been treated as masculine or neuter. Since *Phyllanthodendron* is a modern compound, formed from two Greek words, I treat it as neuter from the gender of its last component.

(1) Sect. **Euphyllanthodendron**

Phyllanthodendron mirabile (Muell.-Arg.) Hemsley, Hook. Ic. **26**: pls. 2563-2564. 1898.

Phyllanthus mirabilis Muell.-Arg. Flora **47**: 513. 1864 et in DC. Prodr. **15**(2): 355.

1866; Beille in Lecomte, Fl. Gén. Indo-Chine **5**: 589. 1927; Pax & Hoffm. in Engl. & Prantl Nat. Pflanzenfam. ed. 2. **19**(c): 63. 1931.

I place this species in *Euphyllanthodendron* from the description and the illustration. It may prove to be near *P. ligulatum*.

Phyllanthodendron ligulatum (Beille) comb. nov.

Phyllanthus lingulatus Beille in Lecomte, Fl. Gén. Indo-Chine **5**: 592. 1927.

The spelling of the epithet *lingulatus* is an evident orthographic error which must be corrected to *ligulatus*. This species is well represented in our herbarium, and in addition I have examined all the material preserved in the herbarium of the Paris Museum. The leaf is fairly symmetric, sometimes slightly auriculate at the base, rather large (up to 15 cm. long and 4 cm. wide), with comparatively few veins (about 7 pairs in a large leaf), apparently subcoriaceous in life. It is a robust woody climber, and its edaphic preference is to the rich soil of decomposed basalt in the primitive forest. The range in Indo-China is prevailing southern and strictly tropical, in Cochinchina, Cambodia and Laos. Beille extends this species to Tonkin, and publishes a variety, var. *tonkinensis* (op. cit. 593). The holotype of this variety, *Balansa* 3290, of which a fragment is available here, belongs to *Phyllanthodendron Poilanei* (Beille) Croiz., not to *P. ligulatum*. It is almost certain that the *Bon* collections cited by Beille from Tonkin also belong to *P. Poilanei*. It is worthy of note that *Balansa* 3290 is listed by Gage under *P. coriaccum*, which is almost certainly an error, but indicates that similar plants range as far south as Perak.

Phyllanthodendron Poilanei (Beille) comb. nov.

Phyllanthus Poilanei Beille in Lecomte, Fl. Gén. Indo-Chine **5**: 593. 1927.

Phyllanthus lingulatus Beille var. *tonkinensis* Beille l.c.

This species is very near *P. ligulatum*, but is distinct from it on account of its smaller leaves and slightly different flowers. Its range is northern in comparison with that of *P. ligulatum*. An unrecorded collection is *Poilane*

16382: Annam, Vinh Province, Mount Len Că, 350 m. alt. The collector reports that this plant, unlike *P. ligulatum*, prefers calcareous shallow soil, being a vine that reaches a length of about 10 feet.

Phyllanthodendron coriaceum Gage, Rec. Bot. Surv. India **9**: 219. 1922; Ridley, Fl. Malay Pen. **3**: 205. 1924.

I have seen no material representing this species, but the description and the citation of *Balansa 3290* (almost certainly an error) indicate that Gage had before him a plant not unlike *P. ligulatum*. The specific epithet was by error printed *dubium*, but in the index to the volume this was replaced by *coriaceum*, and in later distributions of the publication the correction is stamped p. 219. The new binomial was overlooked by the compilers of the current supplement to Index Kewensis.

(2) Sect. **Pseudoactephila**

Phyllanthodendron roseum Craib & Hutchinson, Kew Bull. **1910**: 23. (Febr.) 1910.

Phyllanthodendron album Craib & Hutchinson, op. cit. 279. (Oct.) 1910.

Phyllanthodendron roseum var. *siamensis* Craib, Kew Bull. **1911**: 460. 1911.

Phyllanthodendron siamense Hosseus, Repert. Sp. Nov. **10**: 116. 1912.

Uranthera siamensis Pax & Hoffm. Pflanzenr. **47** (iv. 147. iii): 95. 1911.

Phyllanthus roseus Beille in Lecomte, Fl. Gén. Indo-Chine **5**: 590. 1927.

Phyllanthus albus Beille in Lecomte, l.c.

Phyllanthus roseus var. *glabrum* Beille, l.c.

Phyllanthus roseus Pax & Hoffm. in Engl. & Prantl. Nat. Pflanzenfam. ed. 2, **19**(c): 63. 1931.

Phyllanthus albus Pax & Hoffm. l.c.

Pax & Hoffmann, in making the transfers of *Phyllanthodendron album* and *P. roseum* to *Phyllanthus*, were antedated four years by Beille. Pax, however, was the first author to reduce *Phyllanthodendron* to *Phyllanthus* (Engl. & Prantl. Nat. Pflanzenfam. Ergänzungsh. **1** (Nachtr. 3): 37. 1900), but *Uranthera siamensis*, as noticed by Craib and by Hosseus within one year from its publication, is *Phyllanthodendron*.

A fragment of *Kerr 521*, the type collection of *P. album*, is available in our herbarium. Craib & Hutchinson believe that this species can be distinguished from *P. roseum* by its "foliis lanceolatis, stipulis basi haud productis." I cannot follow them in using these differences as specific characters in this group. The holotypes of *P. album* and *P. roseum* were collected at the same locality (Doi Sotep, near Chiangmai, Siam) and almost at the same altitude (720–800 m.). On the basis of the descriptions I believe that only one species is involved. The variable pubescence of the ovary, which Craib and Hosseus use as a varietal (or as a specific) character, does not impress me as being important enough to deserve consideration, especially for the segregation of distinct species.

So far as the fragment of *Kerr 521* indicates, *P. album* is altogether glabrous on the branchlets and bears but a reduced hispid pubescence on the abaxial side of the petioles. A very poor Chinese specimen in our herbarium might belong here: *Wang 76122*, Yunnan: Fo-Hai, in woods, 1200 m., July 1936.

Phyllanthodendron dubium (Ridley) Gage, Rec. Bot. Surv. India **9**: 219. 1922;
Ridley, Fl. Malay Pen. **3**: 205. 1924.

Cleistanthus dubius Ridley, Jour. As. Soc. Straits Branch **59**: 168. 1911.

Glochidion flavum Ridley, op. cit. **59**: 173. 1911.

A *Curtis* collection from Langkawi, probably the same one cited by Ridley, is in our herbarium. The material suggests *P. album*, but the leaves are longer and more cuneate. I merely follow Gage in the reduction of *Cleistanthus dubius* and *G. flavum*, having seen no specimens.

Phyllanthodendron carinatum (Beille) comb. nov.

Phyllanthus carinatus Beille in Lecomte, Fl. Gén. Indo-Chine **5**: 591. 1927.

A poor fragment of the holotype, *Eberhardt* 2572, is in our herbarium. I believe that the species falls into Sect. *Pseudoactephila*, but this needs to be verified. A leaf about 8 cm. long has but 2-3 pairs of ascending veins that manifestly anastomose at about 8 mm. from the margin. The growth is altogether glabrous, as shown in the specimen, with the exception of few hispid hairs on the abaxial side of the very young leaves.

Phyllanthodendron yunnanense sp. nov.

Arbuscula, 7 m. alta. Ramulis apice costulatis, pube pallide brunnea vel albicante brevi indutis, aetate glabratis, cortice cinereo plus minusve rimoso. Foliis 8-6 cm. longis, 3.5-2 cm. latis, brunneis, firme chartaceis, plerumque inaequilateris, more *Glochidionis* specierum subfalcatis, caeterum ellipticis, venis patule adscendentibus utrinque 8-10-jugis, apice brevius acuminatis, margine hinc inde sub lente acri denticulato-erosis, vix revolutis, nervo medio conspicuo; petiolo brevissimo 2-5 mm. longo, pubescente, stipulis petiolaribus apice acuminato-setaceis, basi rotundatis, pubescentibus, diutius persistentibus vel marcescentibus. Floribus utriusque sexus in glomerulis axillaribus congestis, pedicellis basi hirtellis subcapilliformibus ad 4 cm. longis. Flore ♂: perianthio 5 mm. lato, disco nullo, lobis calycinis 5-(6), ca. 2 mm. longis, centro valde costatis caeterum more generis subhyalinis, apice acutatis, plus minusve calloso-mucronatis, glandulis seu ligulis calycinis tenuissimis, subfiliformibus, cum lobis alternatibus iisque brevioribus; filamentis staminum in columnam coalitis ad 2 mm. longa, antheris didymis ca. 1 mm. longis, connectivo apice eximie producto subulato, pistillodio nullo. Flore ♀: perianthio ♂ sed majore, lobis ad 6 mm. longis, 1.5 mm. latis, ligulis calycinis 3-5 mm. longis, linearibus; ovario globuloso 2.5 mm. magno, parcius setuloso, disco omnino nullo, stylis patentibus, carnosulis, apice integris, sulcatis.

CHINA: Yunnan: Meng-Ka, C. W. Wang 72901, alt. 1670 m., April 1936.

Apparently of the affinity of *P. album*, but altogether different in its foliage.

Phyllanthodendron lativenium sp. nov.

Arbuscula videtur, ramulis apice subherbaceis in sicco nigris, glabris vel glabratis. Foliis 11-6 cm. longis, 2.5-4 cm. latis, tenuiter coriaceis, ellipticis, longe acutatis, interdum subfalcatis, glaberrimis, venis utrinque 8-jugis latius patentibus; petiolo brevissimo 2 mm. longo, stipulis triangulari-acuminatis, glaberrimis, integris, marcescentibus. Flore ♂: pedicello capilliformi, plus minusve flexuoso ad 1 cm. longo, perianthii lobis 5, acutato-callosis, staminibus ut videtur 3 in columnam coalitis. Flore ♀:

pedicello apice leviter subincrassato, rigido, capilliformi ad 2–2.5 cm. longo, perianthii lobis sub fructu reflexis ad 5 mm. longis, apice acutatis. Fructu capsulari *Actephilae* ssp. mentiente, coccis delapsis convolutis ad 2 cm. longis, endocarpio corneo, exocarpio levi brunneo tenuissimo sub lente obscure punctulato, venulis obsito subreticulatis; columella ad 1 cm. longa.

CHINA: Kweichow, woods of "Kouan yn tóng" *Esquirol* 6076, 1200 m. alt.

The material was received in November 1922 at the Paris Museum, where it remained undetermined. The type-specimen is far from satisfactory, but a new species is indicated, somewhat resembling *P. album*, although quite distinct in the characters of its foliage and its fruits.

A specimen from Indochina, Tonkin, Thay Nguyen, Cho-ch, *Eberhardt* 3973, described as a shrub 12–18 feet tall, may prove to belong here, despite its much narrower leaves. Its venation would seem to preclude its reference to *P. carinatum* (Beille) Croiz.

(3) Sect. *Calophyllum*

Phyllanthodendron Dunnianum Léveillé, Repert. Sp. Nov. **9**: 324. 1911, Fl. Kouy-Tchéou 166. 1914.

Phyllanthodendron Cavaleriei Léveillé, op. cit. 454, Fl. Kouy-Tchéou 166. 1914.

Phyllanthodendron Dunnianum Léveillé var. *hypoglaucum* Léveillé, Fl. Kouy-Tchéou 166. 1914.

Phyllanthus Dunnianus Hand.-Mazz. ex Rehd. Jour. Arnold Arb. **14**: 230. 1933.

A strong species, with the calyx-lobes in fruit larger than in any other representative of the genus I have so far seen. The bark of the branchlets tends to exfoliate. The leaves have a conspicuous whitish under surface and bear a type of indumentum which is altogether unusual for the Euphorbiaceae. Under a moderate magnification it is seen to consist of minute irregularly dissected lumps of an apparently resinous exudate. This exudate is doubtfully to be compared to a wax, and is probably analogous to that which appears on the undersurface of the leaves of certain Lauraceae.

Phyllanthodendron anthopotamicum (Hand.-Mazz.) comb. nov.

Phyllanthus anthopotamicus Hand.-Mazz. Symb. Sin. **7**: 223. 1931.

The leaves are smaller and more delicate than are those of *P. Dunnianum* but they bear the same peculiar indumentum, with added whitish, simple or sparingly fascicled hairs along the veins and veinlets. *Handel-Mazzetti* 91 = 10377, collected in S. W. Kweichow, seems at first to differ greatly from *Pételot* 5229, from Indochina, Tonkin, Mount Song-to-Van, Chapa, July 1931. This is described as thriving in humus on calcareous rocks exposed to the full sun at about 1600 m. altitude. The foliage of the *Pételot* material is brown, not whitish beneath, the leaves are slightly broader on the whole than are those of the *Handel-Mazzetti* collection. I am unable to find other differences, especially in the floral parts, however, and treat these two plants for the present at least as conspecific. The Euphorbiaceae of the region of Chapa are usually the same as those of Yunnan, but very seldom, if ever, the same as those of Kweichow.

(4) DOUBTFUL SPECIES

Phyllanthus rubicundus Beille was placed by Beille in the section *Phyllanthodendron* of *Phyllanthus* (Lecomte, Fl. Gén. Indo-Chine 5: 574. 1927). The holotype is a very poor specimen and my fragment of it is hardly satisfactory for the purposes of a critical work. It seems advisable to await the collection of better material before effecting the combination under *Phyllanthodendron*.

Dicoelia Bentham

Dicoelia Beccariana Benth. in Hook. Ic. 23: 70. pl. 1289. 1879.

Little, if anything, has been heard of this species since its publication. A Sarawak specimen in our herbarium, originally distributed as *Trigonostemon*, *Native collector 1843*, being part of the material gathered through the Sarawak Museum for the Bureau of Science, Manila, probably belongs here. It is strikingly like a species of *Trigonostemon* in all its vegetative characters, but the capsules have two seeds in each cell. A second specimen in our herbarium, *Rahmat Si Bocea 7794*: Sumatra, East Coast, Vicinity of Hoeta Bagasan, Asahan, 1934-1935, has ♂ flowers only. The details of these specimens do not agree with those figured by Bentham for *D. Beccariana* and by J. J. Smith for *D. affinis* (Bull. Jard. Bot. Buitenzorg 3 sér. 1: pl. 41, 42. 1920), but the foliage is reminiscent of *Dicoelia*. It is likely that this genus occurs also in the Philippines.

Cleistanthus Hooker f. (*Paracleisthus* Gagnepain)

Gagnepain segregated five species from *Cleistanthus* (Bull. Soc. Bot. France 70: 496-500. 1923, et in Lecomte Fl. Gén. Indo-Chine 5: 496-501. 1927) and proposed for them the new genus *Paracleisthus*. The generic characters of *Paracleisthus* are to be found, Gagnepain avers, in the position and attachment of the ovule: the ovule is pendulous and the obturator (probably the *operculum* of Gagnepain) and funiculus are single in *Cleistanthus*; on the contrary, the ovule is ascending, the funicles are distinct, and the obturator is not present in *Paracleisthus*.

The validity of *Paracleisthus* has been challenged so far but once, by Merrill & Chun (Sunyatsenia 1: 64. 1930), who, affirming the nomenclatural priority of *Cleistanthus Saichikii* Merr., July 24, 1923, over that of *Paracleisthus subgracilis* Gagnep., August 2, 1923, state incidentally, "We reduce the genus *Paracleisthus* to *Cleistanthus*." Pax & Hoffmann (Engl. & Prantl. Nat. Pflanzenf. ed. 2, 19(c): 232. 1931) err in crediting to Gagnepain the publication of a genus *Paracroton*, of which they say, "Bau und Orientirung der Samenanlage sprechen gegen eine Euphorbiacea." Since Pax & Hoffmann refer this genus to the page of the Flore Générale where *Paracleisthus* is described, if not actually published, it is plain that their *Paracroton* is an error for *Paracleisthus*. Their comment that the structure and the position of the ovule are incompatible with an euphorbiaceous plant is unexplainable, because Gagnepain has placed under *Paracleisthus* two well known species of *Cleistanthus*, *C. siamensis* Craib and *C. tonkinensis* Jabl.

I fail to see in Gagnepain's description of the ovulation and placentation of *Paracleisthus* anything which justifies accepting this group as a genus. In his key Gagnepain (in Lecomte, Fl. Gén. Indo-Chine **5**: 235. 1925) states that the ovules of *Paracleisthus* are ascending and have no funicle. This is not borne out by his own illustrations. A manifest funicle is shown in the various species of *Paracleisthus* which he figures, and the position of the point of attachment of the funicle is also shown to vary, being slightly below the middle of the seed in *P. subgracilis* (op. cit. 502. fig. 64, 7) and absolutely basal in *P. tonkinensis* (op. cit. 502. fig. 64, 10). All the ovules of these species, moreover, are *anatropous* even when they are *ascending*, because in them the hilum is central between the micropyle and the chalaza. Gagnepain's confused interpretation of the carpic structures of *Cleistanthus* and *Paracleisthus* appears to be based upon the misapprehension that an ascending ovule is necessarily orthotropous, which is far from being the case. In referring to an "operculum," Gagnepain probably confuses the caruncle with the obturator; these, however, are different organs (see Schweiger, Flora **94**: 339-379. 1905).

Cleistanthus Eberhardtii (Gagnep.) comb. nov.

Paracleisthus Eberhardtii Gagnep. Bull. Soc. Bot. France **70**: 499. 1923, et in Lecomte, Fl. Gén. Indo-Chine **5**: 501. 1926.

A fragment of the holotype is in our herbarium. The species is from Annam and is unlike the others described under *Cleistanthus* and *Paracleisthus* by Gagnepain. It may prove to be very near *C. anomalus* Merr. & Metc.

Cleistanthus Pierrei (Gagnep.) comb. nov.

Paracleisthus Pierrei Gagnep. Bull. Soc. Bot. France **70**: 500. 1923, et in Lecomte, Fl. Gén. Indo-Chine **5**: 498. 1926.

A number of forms and species are in this vicinity which require critical attention. *Cleistanthus Heljeri* Hook. f., as represented by *Heljer* 4886, cited by Hooker (Fl. Brit. Ind. **5**: 280. 1887), appears to be distinct from *C. Pierrei* and *C. siamensis* Craib. *Pierre* 1853, collected at Bao-Chiang, Bien-Hoa Prov., Cochinchina, probably represents another state of the same plant identified by Gagnepain as *P. Pierrei*.

Cleistanthus tonkinensis Jabl. Pflanzenr. **65** (iv. 147. viii): 16. 1915.

Paracleisthus tonkinensis Gagnep. Bull. Soc. Bot. France **70**: 497. 1923, et in Lecomte, Fl. Gén. Indo-Chine **5**: 499. 1926.

Cleistanthus sageretioides Merrill mss. in sched.

This proves to be a common species in Tonkin, to judge from the numerous collections received here in the last five years. It is very easily identified on account of the axillary tufts of brownish hair at the axils of the main veins. The axes bearing flowers also tend to specialize into strictly floriferous brachyblasts, thus approaching *Amanoa*, which Baillon correctly placed near *Bridelia* (Etud. Gén. Euphorb. 580. 1858), consequently near *Cleistanthus*.

A new record for the flora of China is: *Tsang* 22100, Kwangsi, Shap Man Taai Shan, "fairly common in dry clay," April, 1933, originally determined as "*Rhamnus* sp."

Merrill's manuscript binomial has been rather extensively used in herbaria and should be cited.

Cleistanthus indochinensis Merrill mss. in sched., sp. nov.

Arbuscula. Foliis 14–8 cm. longis, 5–3.5 cm. latis, ellipticis, cuspidato-caudatis, basi rotundatis vel cuneato-rotundatis, tenuiter chartaceis, glaberrimis, margine integerrimo calloso hyalino, saepius repandulo, venis omnibus delicatis, primariis utrinque 7–10-jugis; petiolo gracili brunneo-ruguloso, 3–5 mm. longo, stipulis petiolaribus late triangularibus apice setaceis 1–2 mm. longis, margine abaxiali saepius hyalino, integro. Inflorescentiis cymosis axillaribus, in ramulis ipsis vel secus brachyblasta gracilia hispidula congestis. Flore ♂: perianthio glabro, late obconico 4.5 mm. longo ad 6 mm. lato, ultra medium in lobos 5, 2 mm. longis, 1.75 mm. latis, late triangularibus partito; disco callosulo, margine eroso, ligulis ornato late flabellatis ca. 1 mm. longis; columna staminalis ca. 1.5 mm. longa, pistillodio pro ratione columnae sat valido; staminibus 5, filamentorum parte libera vix 0.5 mm. longa, antheris ca. 0.75 mm. longis. Flore ♀ sub fructu immaturo tanto viso: perianthio ut in ♂, lobis 5, 3–5-nerviis, triangulari-acutatis 3 mm. longis, 1 mm. latis, disco subalutaceo integro 1.5 mm. alto, ligulis ad 2 mm. longis, 1 mm. latis, spathulato-rotundatis, bene pedunculatis, sub lente acri glandulosis; capsula 3–4-loculari, submatura ca. 1 cm. lata, 7 mm. longa, stylis patentibus apice bifidis, pericarpio levi, pallide brunneo.

INDO-CHINA: Tonkin, Hoa-Binh Province between Hoa Binh and Vu Ban, *Pételot* 6397, May 1938.

A second collection from the same locality, with the habitat described as a very damp gully ("un ravin très humide"), is *Pételot* 6528, May 1938. The nearly mature capsules of this specimen have been used in drawing up the specific description. *Cleistanthus indochinensis* appears to be closely allied to *C. Eberhardtii*, but it differs in its stipule, inflorescence and leaf-characters.

Cleistanthus Petelotii Merrill mss. in sched., sp. nov.

Arbuscula 7–8 metralis, glabra. Foliis 15–8 cm. longis, 7–3 cm. latis, coriaceis, glabris, apice breviter acuminatis, basi longius gradatimque cuneatis vel rotundato-cuneatis, margine plus minusve revolutis, venis 6–7-jugis sub marginem curvantibus vel curvato-anastomosantibus, trabeculis conspicuius; petiolo rugoso, glabro vix 5–6 mm. longo. Flore ♂: perianthio glabro, 5 mm. longo, 4.5 mm. lato, obconico, ultra medium in lobos 5 triangulari-acuminatos 3 mm. longos, 1 mm. latos partito; disco 1 mm. alto, ligulis obovatis erosulis ad 1 mm. longis, columna staminali ca. 2 mm. longa, staminibus 5, filamentum trigonum breve productis, antheris triangularibus apice in connectivum trigonum breve productis, antheris 0.6 mm. longis. Flore ♀: perianthio paene ♂, 5 mm. magno; disco integro 2 mm. alto, ligulis minimis, ovario globuloso, levi, basi setis lutescentibus cincto, ca. 2 mm. magno, stylis 3 apice subpartitis glandulosulis.

INDO-CHINA: Tonkin, Hoa Binh Province, Muong Thon, road from Hanoi to Hoa Binh, *Pételot* 6396, May, 1938.

A second collection is *Pételot* 6385: Tonkin, Langson Province, between Dong Mô and Van Linh, April, 1938. This new species is outstanding, being characterized by a robust habit and thickish leaves with a sharply etched venation. Its foliage and facies are reminiscent of *Gelonium* Roxb.

Cleistanthus concinnus sp. nov.

Fruticulus videtur ramulosus, innovationibus longa parte pube hispidula rubro-brunnea confertius indutis. Foliis coriaceis, 4–2 cm. longis, 1.5–0.5 cm. latis, supra griseis, subtus pallide brunneis vel cinerascens, pro more generis parvis, pube rara ad costam venas limbumque adpersis, nervis utrinque delicatis revera haud obscuris, utrinque ca. 9-jugis; petiolo hispidulo, 1–3 mm. longo, stipulis petiolaribus 1 mm. longis, unguicularibus, vix setaceis, pubescentibus. Floribus ♂ haud visis. Perianthio ♀ sub fructu 5-lobato, ca. 4 mm. lato, circa ad medium partito, glabro, brevissime pedicellato vel subsessili, pedicello 1.5 mm. longo, columella 3–3.5 mm. longa, coccis delapsis 8 mm. longis, involutis, firmius sublignosis, pericarpio levissimo sparse glanduloso-punctato; semine *Vitis* ssp. figura atque mole simili, forma cordato, ad chalazam valde impresso sublobulato, hilo sub-centrali.

INDO-CHINA: Annam, Phanrang Province, a shrub in dry rocky soil, *Poilane* 12440, Oct. 1925.

Other collections from the same region are: *Poilane* 12457, from Phanrang Province, Cana, open rocks at 1200 m. alt., Oct. 1925, and *Poilane* 2873, vicinity of Nhatrang, Island of Tré, March 1922. The last was determined by Gagnepain as representing *Paracleisthus siamensis*.

Cleistanthus concinnus, *C. siamensis*, *C. Pierrei* and *C. anomalus* are closely related species, apparently characteristic of the flora of the coastal Indo-chinese belt, from Pulo Condor to Hainan and Hongkong. The relationships of the species in this range among themselves and with those of the mainland is still largely conjectural.

Croton Linnaeus**Croton murex** sp. nov.

Frutex vel arbuscula ad 1 m. altus. Ramulorum apicibus grosse dissiteque stellato-tomentosis vel argillaceo-stellatis, subserius glabratis. Foliis 10–6 cm. longis, 3–1.5 cm. latis, distanter verticillatis, rarius alternatis vel oppositis, utrinque pilis stellatis albis paucioribus conspersis subglabratissive, elliptico-lanceolatis, acuminatis vel caudato-acuminatis, basi cuneato-rotundatis vel cuneatis, glandulis 2 stipitatis posticis insignitis, margine obiter distanteque serrulatis vel repandulo-serratis, glandulis marginalibus nullis; petiolo 0.3–10 mm. longo. Inflorescentiis ad 4 cm. longis, rachide sub-filiformi, bracteis minutis. Floribus ♂ immaturis, alabastris pedicellatis, pedicello 2–5 mm. longo, substellato-tomentosis vel glabratis. Floribus ♀ parcius stellato-tomentosis: pedicello in anthesi 2 mm. longo, sub fructu 5–6 mm. longo; calyce fere ad basim partito, 4–5 mm. lato, lobis triangulari-lanceolatis, integris, intus glabratis, ad 2 mm. longis, petalis subnullis glandulosis; ovario ca. 2–3 mm. magno sub lente nigricante, muricato, muricibus (licet processibus carnosulis) praesertim in apice grosse stellato-hispidis, stylis fere ad basim partitis, 4 mm. longis, subulatis, in dorso parcius stellato-tomentosis; capsula (fracta) saltem in dorso coccorum muricata, videtur ad 6 mm. magna.

INDO-CHINA: Annam, 12 km. north of Dankia-Langbiang, a shrub in undergrowth, 1 m. tall, alt. 1200–1500 m., *Poilane* 18657.

This new species suggests the gross morphology of *C. calococcus* Kurz

and *C. Bonianus* Gagnep., but is easily separated from both by its muricate capsules. It differs from *C. alpinus* Gagnep., which has a similar capsule, in the foliage and in numerous intangibles.

***Croton kwangsiensis* sp. nov.**

Frutex ad 4–5 ped. altus. Apicibus tomentosis, indumento rubiginoso vel ochraceo sat grosso. Foliis 16–8 cm. longis, 7–3.5 cm. latis, elliptico-lanceolatis, apice longiuscule acuminatis vel cuspidatis, basi plus minusve rotundatis, firme chartaceis, olivaceis vel brunneo-olivaceis, supra glabrescentibus vel glabris, subtus tomentosis, tomento pallide rubiginoso vel ochraceo, conferto, margine integro glandulis lutescentibus sessilibus obsito, venis saepius supra impressis ca. 6–8 jugis, primo jugo valde adscendente, caeteris plus minusve patentibus; petiolo 1–2 cm. longo, apice glandulis stipitatis patelliformibus 2 insignito. Inflorescentiis subspicatis 2-sexualibus. Floribus ♂ haud visi. Floribus ♀: perianthio ca. 8 mm. lato, subsessili vel brevissime pedicellato (pedicello nec ultra 2 mm. longo), lobis ligulatis, abrupte acutatis 4 mm. longis, 1 mm. latis, pubescentibus, integerrimis; petalis: ligulis setaceis intra lobos; disco e glandulis 5, supra dilatatis, nigricantibus; ovario globoso ca. 3 mm. magno, hispidulo, albicante vel lutescente, stylis 3, liberis, infra tomentosis, supra glabratis nigricantibus, totis ca. 6 mm. longis; columella gracili ca. 5 mm. longa.

CHINA: Kwangsi, Ling-chuan District, fairly common in clay, *Tsang W. T.* 27879, July 1937.

Fairly near *C. latsoniensis* Gagnep., but a less robust plant with more delicate flowers.

***Croton potabilis* sp. nov.**

Arbor ad 10–12 m. alta. Apicibus lepidotis, cupreis, citius glabratis. Foliis 13–5 cm. longis, 5–1.5 cm. latis, firme chartaceis, supra brunneis, subtus argenteo-lepidotis, hic inde maculis cupreis minutissime adpersis, elliptico-lanceolatis utrinque acuminatis, apice acutatis vel cuspidatis, basi arctius cuneatis, venis primariis ca. 8-jugis, margine integro; petiolo 1–3 cm. longo, glandulis minimis sessilibus apice insignito. Inflorescentiis subspicatis, simplicibus 2-sexualibus. Floribus ♂ haud visi. Floribus ♀: perianthio 4 mm. longo, 4 mm. lato, pedicello graciliore per anthesim ca. 5 mm. longo, sub fructu ad 8–10 mm. longo; lobis 5 ca. 3 mm. longis, 1 mm. latis, elliptico-lanceolatis ovarium occultantibus; petalis nullis; ovario globoso ca. 2.5–3 mm. magno, cupreato-lepidoto, stylis 3, fere ad basim liberis, parte infera integra lepidota, 2 mm. longa, supera partita, carnea, 2.5 mm. longa; fructu (ex *Clemens* 3842) capsulari delicato, rubiginoso-lepidoto, globuloso, ca. 5 mm. magno, columella gracillima ad 4.5–5 mm. longa; semine brunneo, levi, 3.5 mm. longo, 3 mm. lato, caruncula more proprio flabellata cum hilo contigua.

INDO-CHINA: Annam, Moi Lanh, Quang-Tri Prov., drunk by the natives in infusion as tea, native name: "Côn che," *Poilane* 10426 TYPE, May 1924. Other collections: Annam, Mt. Bana, small tree in forest, *J. & M. S. Clemens* 3842, 1927; Annam, Ba-na, near Tourane, *Poilane* 7342, 1923.

Gagnepain has described *C. argyratus* Bl. var. *microcarpa* Gagnep. (in Lecomte, *Fl. Gén. Indo-Chine* 5: 277. 1925) and given of this presumed variety a description that would fit *C. potabilis*. I do not know what Gagnepain intends by this variety. The *Poilane* material cited here is de-

terminated by Gagnepain himself as *C. argyratus* Bl., a species from which it differs almost at sight identification. *Croton potabilis* has a much smaller capsule than *C. argyratus* and is easily distinguished from *C. kongensis* Gagnep., *C. budopensis* Gagnep. and *C. scopuligenus* Croiz. by all its ♀ floral characters.

***Croton ignifex* sp. nov.**

Arbustula ad 2.5 m. alta, graciliore. Apicibus diutius argillaceo-tomentosis, indumento pallide ochraceo confertiore. Foliis 5–2.5 cm. longis, 2–1 cm. latis, coriaceis, ellipticis, apice abrupte acuminatis vel rotundatis, basi cuneatis, in sicco pallide olivaceis, margine calloso vix dentato-crenulado, venis ca. 6-jugis, adscendentibus, trabeculis ut venis primariis conspicuis; petiolo 3–8 mm. longo, glandulis minimis. Inflorescentiis subspicatis. Floribus ♂ haud visis. Floribus ♀: perianthio ca. 2 mm. magno, pedicello vix 2 mm. longo; petalis brunneis, ligulatis, vix 1.5 mm. longis vel brevioribus, lobis triangulari-acuminatis ad 1.5–2 mm. longis; ovario globuloso albicante, lepidoto-tomentoso, ad tertium superum e perianthio libero, ca. 2 mm. magno; stylis 3 liberis fere ad basem imam partitis, nigricantibus, ca. 2 mm. longis.

INDO-CHINA: Annam, Island of Tré, a small tree, abundant in the southern part of the island and much used for making torches, *Poilane* 2922, April 1922. Here apparently falls: *Nielsen* 607 E., Nhatrang, Indochina, May 1929.

A characteristically xerophilous plant, with small and coriaceous leaves. It belongs in the affinity of *C. robustus* Kurz, from Southern Burma.

***Croton scopuligenus* sp. nov.**

Frutex humilis vix 0.30 m. altus. Apicibus cupreato-lepidotis, foliorum delapsorum stipulis triangularibus obsitis. Foliis 4.5–2 cm. longis, 4–2 cm. latis, ovatis, apice late acuminatis saepius apiculatis, basi rotundatis, supra brunneis vel rubro-brunneis, subtus subargenteo-lepidotis, venis utrinque ca. 4-jugis, primo jugo plus minusve adscendente, caeteris late patentibus; petiolo 0.5–1.5 cm. longo, lepidoto, apice glandulis 2 patelliformibus insignito, basi stipulis triangulari-acuminatis ad 3 mm. longis aucto. Inflorescentiis, ut videtur, brevibus, conferte lepidotis. Floribus ♂ haud visis. Perianthio ♀ ca. 2 mm. magno, pedicello 1–2 mm. longo; petalis minimis vel nullis; lobis triangularibus 2 mm. longis, basi 2 mm. latis, lepidotis; ovario videtur turbinato, i.e. apice latiore, 2 mm. longo, 4 mm. lato, toto conferte lepidoto; stylis 3, nigricantibus, liberis, quove fere ad basim partito.

INDO-CHINA: Annam, "Signal de 1200 m." west of Cana, *Evrard* 2392, November 1925.

This new species is certainly not *C. argyratus* Bl. or the species immediately allied with it (*C. budopensis*, *C. potabilis*). It agrees only with *C. kongensis* Gagnep., having an essentially similar ♀ flower. It differs from *C. kongensis*, however, in the venation and the shape of the leaves, these being as a rule manifestly lanceolate in that species; in the much larger and much more persistent petiolar stipules; in the habit and size; in the range, *C. kongensis* being restricted to Laos and Yunnan. *C. scopuligenus*, like *C. ignifex*, seems to be one of the xerophilous shrubs characteristic of the vegetation of the coast of southern Annam.

***Croton phuquocensis* sp. nov.**

Arbor videtur vel frutex. Apicibus parcissime stellatis, subglabris. Foliis oblanceolatis vel ellipticis, in sicco brunneis, 15–7 cm. longis, 4–3 cm. latis, apice abrupte acuminatis, ad basem longe cuneatis, margine subintegro, venis ca. 10–16 jugis adscendentibus, limbo subtus minute papilloso-punctulato; petiolo gracili 1.5–4 cm. longo, apice glandulis 2 parvis patelliformibus ornato. Inflorescentiis subspicatis simplicibus. Floribus ♂ haud visis. Floribus ♀ : perianthio e lobis imbricatis, ovarium totum occultantibus, ca. 3 mm. longo, 6 mm. lato; petalis nullis; lobis ovatis, latius imbricatis, subpetaloideis, apice plus minusve callosis, 2.5 mm. longis, ca. 2 mm. latis; glandula ad basem lobis cujusvis 1, utrinque glandulis 2 multoties minoribus obsita, discum totis sub ovario formantibus; ovario trigono depresso-globoso, 1 mm. longo, 2 mm. lato, luteo-lepidoto, apice parcius setuloso; stylis 3, liberis, late patentibus, apice bifidis.

INDO-CHINA: Cochinchina, Island of Phu-quoc, Mt. Retram, *Pierre* 6255, 1874.

Gagnepain has determined this plant as *C. leiophyllus* Muell.-Arg. (in Lecomte, Fl. Gén. Indo-Chine 5: 273. 1925), which I believe to be an error. The perianth and the venation are characteristic.

***Croton pontis* sp. nov.**

Frutex ver arbuscula. Apicibus subglabris, trichomatibus stellatis ca. 15-radiatis parcius adspersis. Foliis in sicco brunneis, 15–9 cm. longis, 4–2 cm. latis, glabris, chartaceis, lanceolatis, utrinque acutatis, venis ca. 7–9-jugis, adscendentibus, a margine 5–3 mm. anastomosantibus, margine serrato (serraturis ca. 5–7 per cm. 2 longitudinis); petiolo 1–1.5 cm. longo, apice utrinque glandulis disciformibus stipitatis 2 onusto. Inflorescentiis subspicatis ca. 10 cm. longis, gracilibus, floribus ♀ singulis, ♂ ad 5 capitulatis. Floris ♂ alabastro ca. 2 mm. magno, staminibus ca. 12. Floribus ♀ : perianthio ca. 2 mm. lato, 4 mm. longo, pedicello 1–1.5 mm. longo; petalis nullis; lobis ligulatis, apice acutatis 1.5 mm. longis, 1 mm. latis, glabris; ovario tomentuloso albicante vel lutescente, ca. 1.5 mm. magno; stylis liberis, 3, ca. 2.5 mm. longis, quove ad medium circa partito.

INDO-CHINA: Tonkin, gully above the "Pont des Linhs," Vin Yen Province, at 50 m. alt., *Pételot* 6504, April 1935.

Croton pontis belongs to sect. *Gymnocroton* Baill. It differs from *C. Hookeri* Croiz., discussed in a previous issue of this Journal (Jour. Arnold Arb. 21: 498. 1940), in the definitely more lanceolate and more deeply serrate foliage, in the much narrower lobes of the ♀ calyx, and in intangibles throughout. It is different from *C. phuquocensis* in every detail of its ♀ flower.

***Croton caryocarpus* sp. nov.**

Arbor parva ad 5–6 m. alta. Apicibus tomentellis lutescentibus indumento interdum sublepidoto, demum glabrat. Foliis 13–8 cm. longis, 5–3 cm. latis, ellipticis vel elliptico-lanceolatis, subcoriaceis vel firme chartaceis, in sicco pallide olivaceis vel pallide luteo-brunneis, adultis glabrat, margine subcartilagineo obscure dentato, venis ca. 9–12-jugis, gracilioribus, late patentibus, sub marginem inconspicue anastomosantibus; petiolo argillaceo tomentoso, 0.5–3 cm. longo, glandulis 2 in apice ad limbum valde obscuris. Inflorescentiis 2-sexualibus, terminalibus vel axillaribus sub-

terminalibus, 10–15 cm. longis. Floribus ♂ : perianthio ca. 5–6 mm. longo, 2–3 mm. lato, pedicello ca. 3 mm. longo; staminibus ca. 10, filamentis ad 1 cm. longis, petalis lobis subsimilibus 2–3 mm. longis, lanceolato-ovatis vel obovatis, glandulis intrapetiolaribus ca. 5. Floribus ♀ : perianthio ca. 5 mm. lato, 2 mm. longo, pedicello crassiore 2.5–3 mm. longo; petalis nullis; lobis carnosulis, apice glandulosus, interdum coarctatis, 2 mm. longis 3 mm. latis; ovario ellipsoideo aureo-lepidoto, 4 mm. longo, 3 mm. crasso; stylis 3 liberis, nigris, quove paulo supra basem bifido, ad 3 mm. longo; disci glandulis (videtur) valde inconspicuis; fructu magno, ellipsoideo, 3 cm. longo, 2 cm. lato, drupam mentiente, vix trisulco durissimo, toto tenuissime aureo-tomentello, indumento vulgo detergibili.

INDO-CHINA: Tonkin, between Kep and Pho Vi, Bac Giang Province, in light forest, *Pételot* 6487, May 1936.

There seems to be a close agreement between the holotype and the following collections: *Bon* 4678, Western Tonkin; *Poillane* 1468, Annam, Tourane 1920; *J. & M. S. Clemens* 3690 and 3968, Annam, Tourane and vicinity. Gagnepain assimilates this new species into *C. Joufra* (in Lecomte, Fl. Gén. Indo-Chine 5: 280. 1925), to which he attributes the range Tonkin-Annam-Siam-Cochinchina. This range is the result of the misinterpretation of several species as *C. Joufra*, which to the best of my knowledge has not been found so far in Indochina. *Griffith* 4776 and *Shaik Mokim* from Assam and Upper Burma are two of the numerous specimens that represent in our herbarium the true *C. Joufra* Roxb. This species and *C. caryocarpus* differ less in definite characters than in sums of intangibles. *Croton caryocarpus*, so far as seen, does not have petals in the ♀ flower, its leaves are more coriaceous, its fruit is thicker, and its seed has a smaller hilum than in *C. Joufra*. It is worthy of note that many are the species of *Croton* in Asia and Australasia which have similar vegetative characters but differ considerably in the size and nature of their fruits. It is due to this peculiarity that *C. oblongifolius*, *C. Joufra*, *C. argyratus* and *C. laevigatus* are confused with many other actually unrelated species in every work that deals with the flora of the tropical Far East.

***Croton Kurzii* nom. nov.**

Croton flocculosus Kurz, For. Fl. 2: 375. 1877; Hooker f., Fl. Brit. Ind. 5: 394. 1887. *Non Geiseler* (1807).

Kurz's binomial is a later homonym of Geiseler's (*Crot.* Monogr. 14. 1807). The material which represents *C. flocculosus* Kurz in the Kew herbarium, according to notes I hastily took in the winter of 1938, resembles *C. yunnanensis* W. W. Smith, from S. W. China, differing from it in the much thinner deciduous indumentum and the range. *Croton Kurzii* is not represented in our herbarium.

***Croton limiticola* sp. nov.**

Frutex bipedalis. Foliis 22–10 cm. longis, 9–3.5 cm. latis, subpergameneis, elliptico-lanceolatis vel oblongo-lanceolatis, apice acuminatis, basi cuneatis vel cuneato-rotundatis, venis primariis utrinque 7–13 bene anastomosatis, latiuscule adscendentibus, margine distante obiterque crenato-serrato, glandula in crena quave stipitata disciformi subsessili; indumento

toto in ramulis foliisque e pilis stellatis robustioribus lutescentibus dissitis; petiolo 0.5-3.5 cm. longo, apice sub lamina ipsa glandulis 2 disciformibus insignito. Inflorescentiis spiciformibus axillaribus vel apicalibus, 1- vel 2-sexualibus, ad 7 cm. longis. Floribus ♂: perianthio vix tomentoso, 8 mm. lato, lobis 5 ovato-ellipticis, 3 mm. longis, 2.5 mm. latis, petalis in laciniis 7-8 ciliato-fimbriatis dissitis, ca. 2 mm. longis, staminibus 13-15. Floribus ♀: perianthio vix tomentoso profunde partito ad 1 cm. lato, pedicello 8 mm. longo, lobis 5, lanceolatis, apice breviter acuminatis, integerrimis, eglandulosus, 5 mm. longis, 2 mm. latis, petalis minutis vel (videtur) interdum nullis; ovario ellipsoideo grosse lepidoto, lutescente, ad 2.5 mm. longo, disco (videtur) nullo; stylis ad 3 mm. longis, stigmatibus crasso ad 1 mm. lato, haud revolutis, sulcatis, apicem in processum productis, vix papilloso; capsula aureo-lepidota, profunde trigona, 5 mm. longa, 5 mm. crassa.

INDO-CHINA: Tonkin, Taai Wong Mo Shan and vicinity, *Tsang* 29584, Sept. 1939.

A strongly marked species, related to *C. erythrostachys* Hook. f. and, more distantly, to *C. Merrillianus* Croiz. The foliage is unlike that of *C. Hancei* Benth.

Croton laevigatus Vahl, *Symb.* **2**: 97. 1791; Muell.-Arg. in DC. *Prodr.* **15**(2): 523. 1866; Merrill in *Lign. Jour. Sci.* **13**: 59. 1934.

No ♀ flowers were left on the holotype of *C. laevigatus* when I inspected it in February 1939. Since the species of its affinity are numerous and can be distinguished only when ♀ flowers and fruits are available, the value of the Vahlian holotype as a taxonomic standard is now much impaired. It is convenient, however, to retain the binomial for the species of *Croton* in Hainan which most closely matches the leaves of Vahl's holotype. I accept, consequently, as *C. laevigatus* the following specimens, all collected in Hainan: *Lau* 108, 1350; *Chun & Tso* 70281; *How* 70471; *Liang* 62777, 63311, 63321; *Wang* 34723, 34766, 35084.

Croton laevigatus does not occur outside of Hainan, so far as I know at present. It is not *C. oblongifolius* Roxb., an isotype of which is represented in our herbarium by a fragment with ♀ flowers kindly given to the writer by Prof. H. Humbert of the Museum of Natural History of Paris.

Croton Laui Merrill & Metcalf, *Lign. Jour. Sci.* **16**: 389. 1937.

Croton hainanensis Merr. & Metc. op. cit. 391. Syn. Nov.

The variability of the indument in good series of specimens is such that two distinct species cannot be recognized. *How* 70548 connects *C. hainanensis* with *Lau* 1566, type of *C. Laui*.

Croton cascarilloides Raeuschel, *Nomencl. Bot.* ed. 3. 280. 1797; Merr. *Trans. Amer. Phil. Soc.* ii. **24**(2): 234. 1935 (Comment. Loureiro Fl. Cochinch.).

Croton punctatus Lour. *Fl. Cochinch.* 581. 1790. Non Jacq.

Croton Cumingii Muell.-Arg. *Linnaea* **34**: 101. 1865, et in DC. *Prodr.* **15**(2): 566. 1866; Gagnepain in Lecomte, *Fl. Gén. Indo-Chine* **5**: 264. 1925.

Croton Cumingii var. *angustifolius* Gagnep. l.c. Syn. Nov.

Croton Pierreii Gagnep. *Bull. Soc. Bot. France* **68**: 558. 1921, et in Lecomte, *Fl. Gén. Indo-Chine* **5**: 265. Syn. Nov.

Croton Cumingii var. *angustifolius* Gagnep. is apparently based upon shoots of new growth arising from wood that has been dormant a long time, and it cannot be accepted otherwise than as a vegetative state of the

typical form. *Poilane* 1725, the holotype of Gagnepain's variety, is a good match of *Clemens* 3929, collected near Hué. Another so-called variety under *Croton*, having the same status as *C. Cumingii* var. *angustifolius*, is the West Indian *C. origanifolius* Lam. var. *abbreviatus* Urban.

Gagnepain separates *C. Pierrei* from *C. cascarilloides* in his key by differences in the styles. His faith in such characters is well known. I regret that I can not follow him, as I can find no difference between *Pierre* 6233, the holotype of *C. Pierrei*, of which a fragment is available here, and a score of specimens which certainly belong to *C. Cumingii* Muell.-Arg.

***Alchornea* Swartz**

***Alchornea androgyna* sp. nov.**

Arbuscula ad 4–5 m. alta. Innovationibus pube subfasciculata hispido-tomentellis. Foliis ovato-ellipticis vel ellipticis, 18–10 cm. longis, 9–6 cm. latis, subtus ad venas venulasque hispido-velutinosus, supra glabrescentibus, margine dentato-serratis, dentibus apice subcallosis breviter cuspidato-acuminatis, basi plus minusve rotundatis, glandulis habitu stipulaceo in apice petioli anticis 2, venis arcte adscendentibus utrinque ad 4–5-jugis, primo jugo longitudinem dimidiam laminae subaequante ergo nervatione eximie 3-plinervia, petiolo 2–4 cm. longo. Inflorescentia terminali, paniculatum decomposita: floribus ♂ glomerulatis, ♀ singulis. Flore ♂ sessili, minimo, lobis late triangularibus vel ovatis, subscariosis, vix 0.75–1 mm. longis, staminibus ca. 5. Flore ♀ sessili vel breviter pedicellato basi utrinque valde glanduloso, lobis lineari-acuminatis ad 2 mm. longis; ovario ellipsoideo ad 3 mm. longo, 2 mm. lato; stylis 3, crassiusculis, subulatis, late patentibus, tenuissime papillosis vel epapillosis, apice vix convolutis vel patentibus.

INDO-CHINA: Tonkin, between Kep and Pho Vi, Bac Giang Prov., *Pételot* 6262, June 1936.

The androgynous cymes and the 3-plinerved venation distinguish this new species from *A. rugosa* Muell.-Arg., which it superficially resembles. *Alchornea annamensis* Gagnep., which has 3-plinerved or nearly 3-plinerved venation, is altogether glabrous and has a much more slender inflorescence.

***Ptychopyxis* Miquel**

As treated here, *Ptychopyxis* Miq. (Fl. Ind. Bat. Suppl. 402. 1860) includes *Podadenia* Thw. (En. Pl. Zeyl. 273. 1861) and *Calpigyne* Bl. (Mus. Lugd. Bat. 2: 193. 1856). Blume's genus has priority but should be rejected as a *nomen confusum*. Blume erroneously believed that different plants, perhaps not even related as to family, constituted *Calpigyne*. He described the flowers of this genus in about 60 words, of which over half deal with the ♂ perianth. This perianth is totally alien to the ♀ plant which typifies *Calpigyne* in the herbarium of Leiden. Blume himself probably became aware of the error he had made, because the ♂ specimens from Celebes, cited first by him in the description of *Calpigyne*, cannot now be found (Prof. J. Lam, *in litt.*). Considering that to use *Calpigyne* a *descriptio emendata* would be necessary, it seems advisable to apply Art. 64

of the Rules of Nomenclature, taking up *Ptychopyxis* in substitution for *Calpigny*, *nomen confusum propositum*.

Ridley (Fl. Malay Pen. **3**: 295. 1924) recognizes four species of *Ptychopyxis* having fruits both "small smooth" (*P. angustifolia*) and "with long processes" (*P. Caput-Medusae*). By so doing Ridley denies generic validity to the nature of the epicarp in this group. The soundness of Ridley's understanding of *Ptychopyxis* is proved by the material in our herbarium. *Maingay 1445* and *Henderson 34800*, representing *P. Caput-Medusae*, cannot be separated generically from *Thwaites 3428*, an isotype of *Podadenia Thwaitesii*; both of these species have fruits of the same nature and vegetative and floral characters which are similar. Such specimens as *Elmer 21524*, from Borneo, suggest at first sight an entity which differs from *Ptychopyxis* by having a much smaller fruit without processes. The value of this character for generic differentiation, however, practically vanishes when it is seen that *Krukoff 4094*, from Sumatra, has a smooth fruit 3.5 cm. long and 2 cm. broad. Thus the only character that could be used to break up *Ptychopyxis* into two genera is the nature of the indument of the capsule. The value of this character is far from decisive in the Euphorbiaceae, so that it seems altogether advisable to accept the following classification:

(1) **Ptychopyxis** Miq. subg. **Podadenia** (Thw.) comb. nov.

Fructibus majusculis, epicarpio processibus elongatis ornato.

Typus: *Ptychopyxis Caput-Medusae* (Hook. f.) Ridley.

(2) **Ptychopyxis** Miq. subg. **Neocalpigny** subgen. nov.

Fructibus minoribus, epicarpio leviori tomentello.

Typus: *Ptychopyxis bacciformis* Croiz.

(1) Subg. **Podadenia**

Ptychopyxis Thwaitesii (Baill.) comb. nov.

Podadenia Thwaitesii (Baill.) Muell.-Arg. in DC. Prodr. **15**(2): 791. 1866; Hooker

Fl. Brit. Ind. **5**: 423. 1887; Pax & Hoffm., Pflanzenr. **63** (iv. 147. vii): 20. 1914.

Podadenia sapida Thwait. Enum. Pl. Zeyl. 273. 1861.

The glandular indumentum of the ovary is altogether peculiar and is possibly formed by staminodes becoming connate with the epicarp.

Ptychopyxis Caput-Medusae (Hook. f.) Ridl. Fl. Malay Penins. **3**: 295. 1924.

Mallotus ? *Caput-Medusae* Hook. f. Fl. Brit. Ind. **5**: 443. 1887.

Hooker quotes Maingay to the effect that the processes of the fruit are stinging and describes them as "spines."

(2) Subg. **Neocalpigny**

Ptychopyxis costata Miq. Fl. Ind. Batav. Suppl. 402. 1860; Ridley, Fl. Malay Penins.

3: 295. 1924; Hook. f. Fl. Brit. Ind. **5**: 455. 1887, et in Hook. Ic. **18**: pl. 1703. 1887.

The specimen available here has no fruit. Ridley thus describes the indumentum: "tomentum bright brown when dry."

Ptychopyxis angustifolia Gage, Rec. Bot. Surv. India **9**: 248. 1922; Ridley, Fl. Malay Penins. **3**: 296. 1924.

Ridley erroneously lists this binomial as a mss. name of Gage. The description of Gage strongly suggests *P. costata* Miq., but Ridley maintains *P. angustifolia* as distinct. I can find no difference between the fruit of the former and of the latter, as described by Ridley.

Ptychopyxis javanica (J. J. Sm.) comb. nov.

Podadenia javanica J. J. Sm. Mededeel. Dept. Landbouw. **10**: 387. 1910; Pax & Hoffm. Pflanzenr. **63** (iv. 147. vii): 21. 1914.

Smith does not describe the ♀ flower or the fruit. The two specimens previously cited, *Vates* 2638 and *Krukoff* 4094, from the east coast of Sumatra, might belong here, from description.

Ptychopyxis philippina sp. nov.

Arbor innovationibus pube velutinoso-hispida aurantiaco-brunnea indutis. Foliis 15-10 cm. longis, 5-3.5 cm. latis, ellipticis, apice breviter acuminatis, basi rotundatis vel subcuneatis, integerrimis, cinereis, supra nitidis, venis ca. 7-jugis adscendentibus, glabris vel glabratibus; glandulis in lamina secus costam 2-4; petiolo ad 2 cm. longo, stipulis petiolaribus obscuris glandulosis. Floribus ♂ in cymulis racemosis, perianthio in alabastro globuloso ca. 2 mm. magno, pedicello ca. 3 mm. longo rufo-hispidulo, staminibus ca. 40-50 late triangularibus, apice in connectivo late trigono productis; pistillodio minimo ellipsoideo 1 mm. longo. Floribus ♀ in cymis subspicatis subsessilibus oligofloris: perianthio 1 mm. alto, grosse lobulato, lobis ca. 5, petalis (staminodiis ?) minutis lobis similibus crassis cum calycis lobis alternatibus; ovario globuloso, 3.5 mm. magno, stylo brevissimo, stigmatibus papillosis reflexis 1 mm. longis; fructu capsulari, tenuiter pubescente, 3-4-loculari, indumento brunneo-aurantiaco, 1.5-2 cm. magno.

PHILIPPINE ISL.: Mindanao, Surigao, *Wenzel* 2710 (♀), 3501 (♂), distributed as "*Podadenia* ?".

Ptychopyxis frutescens nom. nov.

Calpignyne frutescens Bl. Mus. Lugd. Bat. **2**: 193. 1856; Muell.-Arg. in DC. Prodr.

15(2): 1255. 1866; Pax & Hoffm. Pflanzenr. **63** (iv. 147. vii): 254. 1914. *Syn.*

Nov. quoad spec. ♀ tantum.

Foliis coriaceis brunneis bene clathratis, 14-8 cm. longis, 5-3 cm. latis, petiolo brevissimo. Flore ♀: calyce ca. 1.5 mm. alto, grosse lobulato, lobis minute triangularibus carnosulis, stylis 3 papillosis ad 1.5 mm. longis.

BORNEO: Pammaton leg. (Korthals) in herb. Lugd. Batav. [*frustulum in herb. Arnold. Arb. cum icone. photographica*].

The description is based upon a photograph and a fragment of the ♀ plant used by Blume in the generic description of *Calpignyne*. *Ptychopyxis frutescens* is a new name, not a new combination (see Rules Inter. Nomencl. 1935, Art. 69, last paragraph).

Ptychopyxis bacciformis sp. nov.

Coelodepas sp. ? Merr. Univ. Calif. Publ. Bot. **15**: 156. 1929.

Innovationibus parcius pubescentibus vel glabratibus, pube velutinosa olivaceo-brunnea. Foliis 18-9 cm. longis, 5-3.5 cm. latis, ellipticis, ad basem longe ad apicem breviter acuminatis, integris, coriaceis, supra nitidis, optime clathratis, venis utrinque ca. 10-jugis, pilis simplicibus parcissime indutis, glandulis ad radicem ipsam petioli 2 cautissime inquirendis; petiolo hispidulo apice incrassato calloso 2-2.5 cm. longo, stipulis petiolaribus

glandulosis obscuris. Cymis ♀ fructigeris terminalibus, racemosis, velutinis, effusis, sat gracilibus at vix herbaceis, 12–20 cm. longis. Calyce sub fructu vix 3 mm. lato, lobis minimis 4–5; capsula velutinoso habitu bacciformi, indumento tomentello laete brunneo, 1.3–1.7 cm. lata, 1.5 cm. longa; semine vix maturo arillo venuloso praedito, ca. 1 cm. magno, dorso rotundato, facie ventrali applanato.

BRITISH NORTH BORNEO: Elphinstone Prov., Tawao, *Elmer* 21524, 1922–1923.

A second collection is *Elmer* 21771 from the same locality. The leaves are more definitely lanceolate than are those of *P. philippina*.

***Ptychopyxis Poilanei* sp. nov.**

Arbor 18–20-metralis, innovationibus brevissime velutinosus, laete brunneis. Foliis 12–8 cm. longis, 4.5–2 cm. latis, ellipticis, apice brevissime acuminatis basi late rotundatis, coriaceis, integerrimis, venis adscendentibus utrinque ca. 8-jugis, glandulis ad basim laminae 2–4 lente cautissime inquirendis; petiolo ca. 2 cm. longo. Floribus ♂ tantum visis, in inflorescentiis velutinosus 2–4 cm. longis lateralibus cymulosis, bracteolis ad 4 mm. longis fultis; alabastro ca. 3 mm. magno, lobis crassis anisomeris 3–4; staminibus ca. 30–40 in acie 3–4-plici (videtur) alternatibus, pubescentia (staminodiis immaturis?) hispida confertissima intermixtis, ca. 1 mm. longis.

INDO-CHINA: Annam, Nhatrang Prov., north of Nuh-hoa, eastern slopes of the "Massif de la Mère et de l'Enfant," *Poilane* 6398.

The vegetative characters much resemble those of *Meliosma cambodiana* Pierre, but the ♂ flower is characteristic of *Ptychopyxis*.

***Coelodepas* Hasskarl (Nomen Genericum Conservandum Propositum)**
(*Nephrostylus* Gagnepain; *Calpigyne* auct. non Blume)

The citations given under *Coelodepas* and *C. bantamense* by Pax & Hoffmann (Pflanzenr. **63** [iv. 147. vii]: 268–269. 1914) include several errors. They give 1855 as the year of publication of the genus, which was actually published only one year later (Versl. Med. Akad. Wetensch. Amsterdam **4**: 139. 1856). The spelling of the generic name appeared at first in the Greek version, *Koilodepas*, and was altered to *Coelodepas* in the following year (Flora **40**: 531. 1857). The type-binomial remained a *nomen nudum* until 1858 (Hort. Bogor. Descr. **1**: 44). This publication is cited by Pax & Hoffmann as "Retzia I. (1858) 45," but the actual title is "Hortus Bogoriensis descriptus sive Retziae Editio Nova." By citing "Retzia I" a very different publication is indicated, "Retzia sive Observationes Botanicae . . . Pugillus Primus," published by Hasskarl in 1855.

The validity and priority of the spelling *Koilodepas* over *Coelodepas* is unquestionable. *Koilodepas* is not a "clearly unintentional error" (Art. 70) and Hasskarl, having published it, had no right to alter it. The spelling *Coelodepas* has been retained, however, by every author who has dealt with the genus since Hasskarl's time and hence should be listed in the *nomina generica conservanda*.

It is worthy of note that Pax & Hoffmann (Engl. & Prantl, Nat. Pflanzen-

fam. ed. 2, **19**(c): 124, 207. 1931) separate *Coelodepas* and *Nephrostylus* by 113 genera, although they are synonymous.

Coelodepas hainanense (Merr.) comb. nov.

Calpigyne hainanensis Merr. Jour. Arnold Arb. **6**: 135. (July 30) 1925.

Nephrostylus Poilanei Gagnep. Bull. Soc. Bot. France **72**: 476. (August 4) 1925, et in Lecomte, Fl. Gén. Indo-Chine **5**: 327. 1925.

No differences can be found by which the Hainan and Indo-China material can be distinguished. The fact that *Nephrostylus* is a synonym of *Coelodepas* can easily be verified, even without specimens, by comparing the following illustrations: (1) *Coelodepas Wallichianum* Benth. in Hook. Ic. **13**: 69, pl. 1288. 1879; (2) *Coelodepas bantamense* Hassk. in Pflanzenr. **63** (iv, 147, vii): 269, fig. 42. 1914; (3) *Nephrostylus Poilanei* Gagnep. in Lecomte, Fl. Gén. Indo-Chine **5**: 328, fig. 37. 1925. One of the characters of *Coelodepas* that will bear closer study is the degree of accrescence of the ♀ calyx, this probably having sectional or subgeneric significance.

Macaranga Thouars

Macaranga Poilanei Gagnep. Bull. Soc. Bot. France **69**: 703. 1922, et in Lecomte, Fl. Gén. Indo-Chine **5**: 448, fig. 51, 1. 1926.

Mallotus Tsiangii Merr. & Chun, Sunyatsenia **1**: 62. 1930; Chun, Ic. Pl. Sin. **4**: 12, pl. 162. 1935. Syn. Nov.

The material in our herbarium is ample to establish that only one entity is involved under these two binomials. The range of *M. Poilanei* as now known includes Kwangtung, Hainan, Tonkin and Northern Annam.

Macaranga trigonostemonoides sp. nov.

Frutex ad 2 metr. altus, innovationibus hispide puberulis, sordide brunneis. Foliis 8–5 cm. longis, 3–1.75 cm. latis, elliptico-lanceolatis, apice breviter cuspidato-caudatis, basi cuneato-rotundatis, praeter venas hispidopuberulas vel glabratis glabris, margine obscure crenatis, glandula e vena in crena quave sessilis, venis optime penninerviis, utrinque ca. 6-jugis, limbo ad basim glandulis pustulosis marginalibus 2–4 notato, subtus minute atroglanduloso; petiolo puberulo 1.5–2 cm. longo. Inflorescentia ♀: axi lentiusculo, sat rigido velutinoso, ad 10–12 cm. longo, flores plures (5–8) quorum 1 saepius apicalem ferente; bracteis floralibus foliaceis ovatis vel ovato-cuspidatis, sessilibus, margine obscure serratis, ceraceo-glandulosis, 1–1.5 cm. longis, 0.7–1.10 cm. latis; perianthio 3 mm. lato, saepius 4-lobo, ovario 2 mm. longo, 3 mm. lato processibus glabris carnosulis ad costam coccorum parcius obsito, caeterum crustaceo-glanduloso sublevi, pedicello ad 2 mm. longo, stylis vix papillois, 1.2–1.5 cm. longis haud involutis.

INDO-CHINA: Taai Wong Mo Shan and vicinity, near the Kwangtung border, Tsang 29230, June 1939, fairly common in thickets on sandy soil.

Although this new species resembles *M. Poilanei* Gagnep., *M. bracteata* Merr., and *M. Esquirolii* Rehd., it is manifestly different from these three species. Tsang 30351, 29368 belong here; Tsang 29191, 29543, which are only ♂, probably belong here.

Macaranga rosuliflora sp. nov.

Frutex videtur. Ramulis strictis, glabris, rubescentibus, sub apicibus ceraceo-glandulosis, setaceo-stipulosis. Foliis 9–3 cm. longis, 5–1 cm. latis,

elliptico-lanceolatis, apice longiuscule acuminatis, basi subcuneatis levissime auriculatis, venis late adscendentibus utrinque ca. 7-jugis, glabratis vel glabris, margine subintegro, limbo subtus minutissime glandulis luteis obsito. Inflorescentia ♂: rachide gracillimo spiciformi ad 5 cm. longo; bracteis squamulosis integris triangularibus vix 1 mm. longis, quave perianthia 3-4 axillante; perianthio minimo ca. 3 mm. lato, staminibus ad 15. Inflorescentia ♀: pedunculo alari elongato, 4-8 cm. longo, apice verticillatim 3-4-bracteato, florem unicum apicalem (videtur) ferente; bracteis foliis omnino similibus at minoribus 1-2 cm. longis, 3-6 mm. latis; calycis lobis sub fructu lineari-lanceolatis ad 2 mm. longis; capsula submatura vix 7-8 mm. lata glandulis ceraceis detergibilibus exceptis levi, coccis 2 subdivergentibus inde fructu primo intuitu nempe subbicorni gibboso; semine globuloso 3.5 mm. magno, arillodio striato, hilo magno.

INDO-CHINA: Sai Wong Mo Shan (Sai Vong Mo Leng), near the Indo-China-Kwangtung border, *Tsang* 30591, May-December 1940.

The characters of the holotype of this species may not be found to match exactly those of the majority of the specimens. There is an indication in the material seen that plants which are prevailingly ♂ have only small or very small bracts on their ♀ axes. *Tsang* 30591 is almost wholly ♀, and this may account for the large foliaceous bracts which it exhibits in the fruiting stage. It is likely, consequently, that *M. rosuliflora* is represented by the following additional numbers having small bracts: *Henry* 12143; *Tsang* 22049, 22428, 22681, 23814, 24213; *Liang* 69601, 70157; *Teng* 90803 from Yunnan, Kwangsi, Kweichow and Kwangtung. The majority of these collections have been determined as *Mallotus Tsiangii* Merr. & Chun, which is a synonym of *M. Poilanei* Gagnep. A specimen from Pierre's herbarium [a fragment available here], credited to "Masters, Assam" and labelled *Macaranga digyna* Muell.-Arg., suggests this new species and may in fact belong to it. It hardly belongs to *M. digyna*, to judge from Wight's illustration (Ic. Pl. Ind. Orient. 5: pl. 1884. 1852).

***Epiprinus* Griffith**

(*Symphyllia* Baill., *Adenochlaena* auct. non Baill.)

The following specimens are available to me: (1) *Griffith*, Malacca, isotype of *Epiprinus malayanus* Griff.; (2) *Thomson* "Claoxylon 14," isotype of *Symphyllia mallotiformis* Muell.-Arg.; (3) *Griffith* 4913, isotype of *Symphyllia siletiana* Baill. α *trichantha* Muell.-Arg.; (4) *Thwaites* 2111 (a fragment), holotype of *Centrostylis zeylanica* Baill. in herb. Paris; (5) *Balansa* 3246, isotype of *Epiprinus Balansae* Gagnep.

This material shows that *Centrostylis*, treated by many authors as congeneric with *Adenochlaena*, is not congeneric with *Epiprinus*. This material proves, likewise, that *Symphyllia* and *Epiprinus* are congeneric. The differences separating *E. malayanus* and *S. siletiana* are: (1) the number of the stamens, this being 8-10 in *E. malayanus* and not over 4-5 in *S. siletiana* and its group; (2) the degree of accrescence of the ♀ calyx, which is greater in *E. malayanus* than in *S. siletiana* and its group. It is worthy of note, however, that *E. malayanus* is a larger and coarser plant than *S. siletiana* and the species in its affinity.

Since *E. Balansae* is intermediate in its characters between *Epiprinus* and *Symphyllia* and these two entities are otherwise closely related, I propose the following disposition:

Epiprinus Griff. Notul. Pl. As. **4**: 487-489. 1854; Muell.-Arg. in DC. Prodr. **15**(2): 1024. 1866; Hook. f. Fl. Brit. Ind. **5**: 463. 1888; Pax & Hoffm. Pflanzenr. **68** (iv. 147. ix-xi): 109. 1919, et in Engl. & Prantl, Nat. Pflanzenfam. ed. 2. **19**(c): 148. 1931.

Symphyllia Baill. Etud. Gén. Euphorb. 473. pl. 11. fig. 6-7. 1858; Muell.-Arg. in DC. Prodr. **15**(2): 763. 1866; Pax & Hoffm. Pflanzenr. **44** (iv. 147. ii): 15. 1910, et in Engl. & Prantl, Nat. Pflanzenfam. ed. 2, **19**(c): 123. 1931. Syn. Nov.

Adenochlaena Baill. sect. *Symphyllia* Hook. f. Fl. Brit. Ind. **5**: 418. 1887.

(1) **Epiprinus** subg. **Euepiprinus** subg. nov.

Calyce ♀ accrescenti, fructu sat magno, foliis majusculis distinguitur. Species typica: *E. malayanus* Griff.

(2) **Epiprinus** subg. **Symphyllia** (Baill.) subg. nov.

Calyce ♀ vix accrescenti, fructu nec ultra 1-1.5 cm. magno, foliis minoribus dignoscitur. Species typica: *E. siletianus* (Baill.) Croiz.

Epiprinus mallotiformis (Muell.-Arg.) comb. nov.

Symphyllia mallotiformis Muell.-Arg. Linnaea **34**: 156. 1865, et in DC. Prodr. **15**(2): 764. 1866; Pax & Hoffm. Pflanzenr. **44** (iv. 147. ii): 15. 1910; Gamble, Fl. Presid. Madras **2**: 1323. 1925.

Adenochlaena indica Bedd. ex Hook. f. Fl. Brit. Ind. **5**: 418. 1887. Syn. Nov.

Much more delicate in all its parts than *E. malayanus*. The stamens are 4, not 8 as in that species. Apparently restricted to the Deccan.

Epiprinus siletianus (Baill.) comb. nov.

Symphyllia siletiana Baill. Etud. Gén. Euphorb. 474. 1858; Muell.-Arg. in DC. Prodr. **15**(2): 764. 1866 [*Silhetiana*]; Kurz For. Fl. Brit. Burma 378. 1877 [*Silhetana*].

Adenochlaena silhetiana Hook. f. Fl. Brit. Ind. **5**: 418. 1887.

Two specimens from Yunnan, S. W. China, which have been referred by Merrill to *Homonoia* as probably representing *H. symphylliaefolia* Kurz (Lingn. Jour. Sc. **19**(2): 188. 1940) appear to belong here. They are: *Henry 13161* and *Wang 77905*. Another unreported collection is *Wang 80117*, from the same Province. It is possible that *E. hainanensis* Croiz. from Hainan is scarcely better than a variety of *E. siletianus*. *Homonoia* does not belong in the same affinity with *Epiprinus*; branched stamens occur in certain species of *Macaranga*, for instance, *M. Daveyi*.

Epiprinus lanceifolius sp. nov.

Arbor vel frutex. Innovationibus parcellissime stellato-tomentulosis mox glabratis. Foliis 17-9 cm. longis, 5-2.5 cm. latis, exquisite elliptico-lanceolatis, apice caudato-acuminatis interdum subfalcatis, glaberrimis, supra nitidis, venis utrinque ca. 7-11-jugis, patentibus, trabeculis manifestis, margine laminae integro, basi glandulis 2 obscurissimis maculato; petiolo apice incrassato, ibique interdum more *Alchorneae* ssp. stipellato, glabro, 0.3-1.5 cm. longo. Inflorescentiis secus cymas spicatas lentas in glomerulis confertis dispositis, ♂ tantum visis, axi tomentello, pallide luteo. Perianthio subsessili, basi interdum glandulifero, ca. 3 mm. lato, 2 mm. longo, lobis 4 integerrimis, habitu cochleatis, ad 1.25 mm. longis, staminibus 4; pistillodio columnari, sat evoluto, ad 1 mm. longo, apice irregulariter apiculato-incrassato.

INDO-CHINA: Tonkin, Pho Ho, *Du Pasquier* 3060 [*Pételot*], 1927.

A strong species with all the floral characters of the genus. It is allied to *E. Poilanei* Gagnep., but is unlike it in its foliage and inflorescence.

Trigonostemon Blume

Trigonostemon asahanensis sp. nov.

Arbor. Innovationibus glabratiss, pilis tantum setaceis brevibus sparsis onustis, citissime griseo-corticatis. Foliis 15–7 cm. longis, 6–3 cm. latis in sicco atris, glabris, firme chartaceis, ellipticis, apice plus minusve acutato-cuspidatis, basi cuneatis, margine grosse repandulo-serratis, venis conspicuis patentibus ca. 8–12-jugis; petiolo glabro, eglanduloso 1–1.5 cm. longo. Floribus ♂ (mancis) parvis, sepalis 5, latissime imbricativis, 3 mm. longis, 2 mm. latis, exterioribus plus minusve petaloideis in pedicellum ipsum abeuntibus, interioribus optime petaloideis, (videtur) albicantibus basi tantum incrassatis, coloratis; petalis 5, ovato-rotundatis, albidis; staminibus ca. 10, (videtur) in pulvinulum aggregatis, pistillodio nullo, columna staminali nulla. Floribus ♀ 10–13 mm. latis, singulis vel in racemulos oligofloros laterales congestis, pedicello 1.5–2 cm. longo, sepalis 5 obovatis, minutissime setulosis vel glabratiss, margine integris anthesi peracta haud accrescentibus, 3 mm. longis, 2 mm. latis, petalis 5 cum sepalis alternatibus, obovatis, 5–6 mm. longis, ca. 4 mm. latis; ovario glaberrimo, atro, ad 3–4 mm. magno, grosse verrucoso-papillato, stylis 3 profunde partitis ca. 4 mm. longis, disco vix 0.5 mm. alto subintegro.

SUMATRA: Asahan, vicinity of Tomoean Dolok, alt. ca. 1000 m., *Rahmat Si Boeea* 9872 TYPE, Aug. 1939.

Two other specimens from the same Province belong here: *Rahmat Si Boeea* 9431, Tor Matoetoeng, 1792 m. alt., July 1936 (used to describe the ♂ flower); *Rahmat Si Boeea* 9567 [2 sheets], vicinity of Aek Salabat, northeast of Tomoean Dolok, ca. 450 m. alt., July 1936.

I am not sure that *Trigonostemon* is the genus for this species. It suggests *Dimorphocalyx* Thw. in every respect, but the sepals of the ♀ flower are not accrescent, which is believed to be the only character that separates *Dimorphocalyx* from *Trigonostemon*. The genera in this vicinity require critical attention, and a final disposition of this new species must await the collection of fruiting material and a general revision of the *Trigonostemon* alliance.

ARNOLD ARBORETUM,

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STUDIES OF THE ICACINACEAE, II
HUMIRIANTHERA, LERETIA, MAPPIA AND NOTHAPODYTES,
VALID GENERA OF THE ICACINEAE

RICHARD A. HOWARD

With four plates.

THE four genera considered here have been treated at various times and by various authors as one. They belong to that general group of the Icachineae having free petals which are pilose on the inside. This contribution is an attempt to clarify the problem by redefining the genera and by incorporating new lines of evidence taken from studies of the wood, pollen and fruits.

Humirianthera is a distinct genus. The limits of the remaining genera have been drawn in various manners. Baillon (*Adansonia* **3**: 367. 1862-3) considered them all as synonymous with *Ikacina*. Bentham and Hooker (*Gen. Pl.* **1**: 351. 1862). Engler (*Mart. Fl. Bras.* **12**(2): 50. 1872) and House (*Amer. Midl. Nat.* **8**: 62. 1922) have considered them under either *Mappia* or *Leretia*. In Baehni's recent monograph the *Mappia* complex has been divided. The Old World species were placed in the newly proposed genus *Neoleretia* while the New World species were retained in the emended genus *Mappia*. Baehni acknowledged *Mappia* of Jacquin to be an invalid name; however, since its predecessors are also invalid, he proposed the name be added to the list of *nomina conservanda*. Baehni, however, misinterpreted the genus *Nothapodytes* Blume, which other workers have shown to be made up of the Asiatic species of "*Mappia*." Recently, Sleumer (*Notizbl.* **15**: 247. 1940) has rejected Baehni's genus *Neoleretia* and transferred most of the species to *Nothapodytes*. This appears to be the correct procedure. Applying strict priority Sleumer also rejected the name *Mappia* Jacq. as a later homonym and took up the name *Leretia* Vell. for the American species. Before his paper appeared, the name *Mappia* Jacq. had been published in the official supplementary list of additions to the *nomina conservanda* in the Kew Bull. for July 1940.

Baehni and Sleumer have placed all the New World species of the *Mappia* complex in one genus. With this I do not agree. At least *Leretia cordata* (including *L. Vellozii*, *L. nitida*, and *L. Poeppigiana*) cannot belong in the genus *Mappia*, as differences are found in the wood, pollen grains, fruits, and centers of distribution.

The segregation of the *Mappia* complex accepted here is not new. Miers (*Ann. Mag. Nat. Hist.* II. **9**: 392. 1852) and Engler (*Nat. Pflanzenfam.* III. **5**: 249. 1893) have both considered *Mappia* and *Leretia* distinct. Baehni has pointed out the differences between the Old and New World

groups. There has been, however, no critical comparison of these genera and no attempt to tabulate their differences. This I have supplied in the present paper.

A complete synonymy and history of the group was given in Baehni's work.

Survey of the diagnostic generic characters

Leretia Vellozo

Lianas; inflorescent axillary; pedicels bracteate; calyx lobed; filaments arcuate, attached dorsally, connective linear, usually extended beyond the anther sacs to an inconspicuous tip; pistil usually with two abortive styles, ovary with a glabrous columniform base, pubescent in the locule, disk absent; fruit large, mesocarp thin and dry, putamen thin, pubescent inside, funicle in a tubular canal in the putamen; cotyledons folded, wrinkled, not displaced laterally, their margins superimposed.

Mappia Jacquin

Trees; inflorescence axillary; pedicels ebracteate; leaves commonly with dorsally axillary pores; calyx toothed; filaments attached to the base of the connective; pistil symmetrical, disk fleshy foliaceous; fruit with fleshy mesocarp, endocarp moderately thick, funicle in the mesocarp; cotyledons flat, not displaced laterally, their margins superimposed.

Nothapodytes Blume

Trees; inflorescence terminal; pedicels ebracteate; calyx toothed; filaments attached dorsally to the connective and fused with a cushion formed of apparently reflexed basal lobes of the anther sacs; pistil symmetrical, disk fleshy foliaceous; fruit with fleshy mesocarp, putamen thin, funicle in the mesocarp; cotyledons flat, laterally displaced, their margins not superimposed.

Humirianthera Ducke

Lianas; inflorescence terminal or falsely lateral; pedicels bracteate; calyx deeply lobed; filaments attached dorsally, connective triangular, extended beyond the globose anther sacs to a tapering apex; pistil with an acentric style, disk lacking; fruit large with a thick woody putamen, funicle in a tubular canal; cotyledons frequently folded, not displaced laterally, their margins superimposed.

Of these four genera *Humirianthera* is the most distinct. In their treatments of the other genera of the *Mappia* complex, previous workers have placed too much emphasis on the form and pubescence of the calyx. A study of considerable material shows that the characters that have been emphasized are extremely variable. There are, however, reliable differences in the stamens which have been overlooked. The differences in the method of attachment of the filaments and anthers are of value in readily distinguishing the genera. In *Nothapodytes* the connective is short, so that the filament appears to be attached near the middle of the anther. Furthermore, the extension of the anther sac tissue in a reflexed basal lobe is unusual and quite diagnostic. Elongation of the filament before the flower opens causes it to arch behind the anther while the basal portion of the filament remains strict. *Mappia* and *Leretia* are quite in contrast to this. *Mappia* has the filament attached basally to the connective and there is no

arching of the filament. Here elongation in bud condition causes contortion of the filament below the anther. The filaments of *Leretia* are more slender and are attached dorsally to a linear connective which commonly projects beyond the anther sacs in a small tip. Elongation of the filaments in *Leretia* produces an abaxial arching similar to that found in *Nothapodytes*.

The pistil in *Mappia* and *Nothapodytes* has a terminal style and is quite symmetrical. In *Leretia* the pistil is asymmetrical with a slightly acentric style. Frequently two papillae or presumably rudimentary styles are present. A fleshy foliaceous disk subtends the ovary in *Nothapodytes* and in *Mappia*. *Leretia* has a columniform, at times hairy, base to the pistil and some authors have called this a "disk." *Leretia* also differs from the other genera by having long tangled hairs on the inside of the locule. These are present in the mature fruit as long sparse smooth-walled usually straight hairs. These hairs are not present in *Mappia* and *Nothapodytes*.

The fruit of the Icacinaceae is typically a drupe with a sclerified putamen. In each cell only one pendant anatropous seed is developed from the two ovules. In the genera of the family having the liana habit, generally speaking, the funicle is enclosed in the putamen. In the other genera of the family, the funicle may lie between two projecting ridges of the putamen in mesocarp tissue or it may lie free in the mesocarp. In all the specimens of *Leretia* that I have examined, the funicle travels up the putamen in a special tubular canal until near the apex, where it enters the locule. In *Mappia* and *Nothapodytes* the funicle, in the material I have studied, is never enclosed in the putamen, although two projecting ridges lateral to it may be developed. The funicle may, however, enter the putamen and travel in a tubular canal a short distance before making an abrupt turn and entering the locule. Whether enclosed in the putamen or free in the mesocarp, the funicle lies on the margin in those fruits that are slightly flattened. In contrast to this, the raphe is always found on the broad face of the seed. In other words, an adjustment of 90° exists between the position of the funicle and the raphe. The raphe is generally strap-shaped and terminates in a flattened circular chalaza at the end of the seed opposite the micropyle. This is true of all genera of the family in which the fruits have been studied.

The axillary inflorescences found in *Mappia* and *Leretia* distinguish these genera from *Nothapodytes*, in which the inflorescence is terminal. The flowers are articulated to the pedicels immediately below the calyx in all genera of the *Mappia* complex. *Leretia* differs from *Nothapodytes* and *Mappia*, however, by having small bracts at the top of the pedicel. *Nothapodytes* and *Mappia* are without bracts.

The pores in the axils of the veins and midrib on the lower surface of the leaves of several species of *Mappia* have been mentioned by previous workers. These appear to be quite similar to those found in some of the South American species of *Citronella* (Howard, Jour. Arnold Arb. **21**: 478. 1940). I have not been able to find mites in these, as are so commonly found in *Citronella*. Likewise, in *Mappia* the pores are without internal hairs.

The specimens used in this study and cited in this current paper are from the herbaria of the Arnold Arboretum (A); Field Museum of Natural History (FM); Gray Herbarium (G); New York Botanical Garden (NY); Atkins Institution of the Arnold Arboretum, Soledad, Cuba (So); and the United States National Museum (US).

Leretia Vellozo

Leretia Vellozo, Fl. Flum. 99. 1825, Fl. Flum. Ic. 3: t. 2. 1827; Bentham, Trans. Linn. Soc. 18: 680. 1838; Miers, Ann. Mag. Nat. Hist. II. 9: 392. 1852, III. 4: 364. 1859; Valetton, Crit. Overz. Olac. 184. 1886; Engl. Nat. Pflanzenfam. III. 5: 250. 1893.

Lianas (or shrubs and small trees with eventually scandent branches), lenticels inconspicuous; leaves alternate, short-petioled, the petioles shallowly canaliculate, the margins entire, slightly revolute; inflorescences axillary much-branched cymes or panicles, pedunculate; flowers articulated to short bracteate pedicels, perfect or rarely unisexual by abortion, the five calyx lobes subacute to rounded; petals (4-)5, free, valvate with inflexed tips; stamens (4-)5, free, filaments filiform, arcuately attached dorsally, the connective extended into an inconspicuous tip, the anthers oblong, introrse, longitudinally dehiscent; pistil asymmetrical usually with two abortive styles, functional style glabrous, the stigma capitate, the ovary hirsute with a columniform base which is also frequently hirsute, one-celled; ovules two, pendant from the apex, anatropous; fruit drupaceous, glabrate, ovoid-ellipsoid, slightly flattened, apex obliquely umbonate, mesocarp scarcely fleshy, the putamen tenuous, smooth; seed one, albuminous, the embryo with wrinkled cotyledons which are not displaced but have their margins superimposed.

TYPE SPECIES: *Leretia cordata* Vell.

DISTRIBUTION: Brazil, British Guiana, and Peru.

Leretia cordata Vell. Fl. Flum. 99. 1825.

Leretia Vellozii Miers, Ann. Mag. Nat. Hist. II. 9: 392. 1852, III. 4: 364. 1859.

Leretia nitida Miers, Ann. Mag. Nat. Hist. III. 4: 365. 1859.

Mappia cordata Engl. in Mart. Fl. Bras. 12(2): 50. 1872.

Mappia nitida Engl. in Mart. Fl. Bras. 12(2): 51. 1872.

Mappia Poeppigiana Baill. Adansonia 11: 175. 1874.

Icecina (?) *Poeppigiana* Valetton, Crit. Overz. Olac. 187. 1886.

Leretia Poeppigiana Sleumer, Notizbl. 15: 245. 1940.

Branches terete to angular, red-brown in color, appressed short-strigose-pubescent, becoming glabrate, the older branches with dark brown corky bark; leaves alternate, petioles stout, commonly twisted, 0.8-1.5 cm. long, densely chestnut strigose-pubescent below, becoming glabrate, corky at maturity; lamina ovate-lanceolate to oblong or elliptic, 10-19 cm., rarely 30 cm. long, 4-12 cm. broad, apex acute with an apiculate point to rounded or obtuse, base acute or rounded, dark green above and frequently shining, commonly lighter below, the upper surface sparsely short white pilose-pubescent, soon becoming glabrate, lower surface commonly with white or yellowish malpighiaceus hairs with almost equal arms, rarely with weak stellate clusters of pilose hairs, midrib prominent, stout, strigose-pubescent, sulcate above, the veins 6-8 on each side, prominent, gracefully arcuate, anastomosing near margin to form a complex reticulum, with numerous

less prominent interpolated veins; inflorescence to 18 cm. long and 10 cm. wide, the peduncles and pedicels densely golden strigose-pubescent, the pedicels 2-4 mm. long, bracteate, the bracts ovate, acute, strigose-pubescent; calyx 2 mm. in diameter, patelliform, lobes or teeth 0.5-0.8 mm. high, densely golden hirsute or strigose; petals lanceolate-ovate or oblong, 2.5-3.4 mm. long by 1.5-2 mm. broad in bud, 4.8-5.5 mm. long and 1.8-2 mm. broad at maturity, the midrib moderately well developed, densely hirsute outside, inside long-pilose or tomentose, the inflexed apex glabrous; stamens 4-4.5 mm. long, the anthers 0.7-1 mm. long; ovary 1.5 mm. in diameter at anthesis, the locule densely hirsute or tomentose inside, the functional style 2-2.5 mm. long, the rudimentary styles rarely exceeding 0.3 mm. in length; fruit 3.5-4.5 cm. long, 2-2.5 cm. wide and 1.5-2 cm. thick, the base acute or tapering, the apex acute, hirsute when young but glabrate at maturity, the putamen papery, scarcely woody, sparsely pubescent inside with long pilose hairs; seed pendant from near the apex, to 2.5 cm. long, 1.5 cm. wide, 1 cm. thick, the raphe traveling obliquely down the seed to a circular chalaza near the base, the embryo one-half to two-thirds the length of the seed, to 1.3 mm. long, the cotyledons oval to obovate, to 1 cm. wide, apex rounded, venation rapidly dichotomizing at base, the radicle minute, 1 mm. long, cylindric.

TYPE LOCALITY: Pará, Brazil.

ILLUSTRATIONS: Vellozo, Fl. Flum. Ic. **3**: t. 2, 1827; Miers, Contrib. **1**: t. 7, as *L. Vellozii*. 1851-61; Engl. in Mart. Fl. Bras. **12**(2): t. 11, as *L. nitida*. 1872; Valetton, Crit. Overz. Olac. pl. **5**, fig. 29, as *L. cordata*. 1886, fig. 30, as *L. nitida*. 1886; Engl. Nat. Pflanzenfam. III. **5**: fig. 139, D-F, as *L. nitida*. 1893; Baehni, Candollea **7**: pl. 4, fig. 1, A-B, as *M. cordata*; fig. 1, C, as *M. Poeppigiana*. 1936.

DISTRIBUTION: Brazil, British Guiana, Peru.

BRAZIL: Amazonas: Near mouth of Rio Embira, *Krukoff* 5021 (A, NY); Bahia: *Blanchet* 2347 (FM); Pará: Boa Vista on Tapajos River, *Dahlgren and Sella* 158 (FM). BRITISH GUIANA: Northwest slopes of Kanuku Mts., drainage of Moku-moku creek, *Smith* 3591 (G, NY); Kamakusa, upper Mazaruni river, *La Cruz* 4235 (FM, G, NY, US); Waini river, Northwest district, *La Cruz* 3794 (NY). PERU: Loreto: Puerto Arturo, lower Rio Huallaga, *Killip and Smith* 27869 (FM, NY, US); Mishuyacu, near Iquitos, *Klug* 345 (FM, US), *Klug* 641 (FM, NY, US), *Klug* 666 (FM, NY, US), *Klug* 1215 (NY); Balsapuerto, *Klug* 2967 (A, FM, G, NY, US); Caballo-Cochoa, *Williams* 2067 (FM), *Williams* 2055 (FM, US), *Williams* 2084 (FM); Iquitos, *Williams* 3541 (FM); San Martín: Tarapoto, *Spruce* 4492 (FM photo, NY); Juan Jui, Rio Huallaga, *Klug* 3892 (FM, G, NY, US); Tarapoto, *Williams* 6042 (FM, US); Maynas, *Poeppig* 2329 (FM photo). Peru-Colombia boundary: Rio Putumayo, *Klug* 1633 (A, FM, G, NY, US).

NATIVE NAME: Puca yacu (Williams).

As Baehni points out, there are no significant differences between *L. nitida* and *L. cordata*, and they must be considered as identical. However, Baehni does distinguish between *M. cordata* and *M. Poeppigiana* on the shape of the leaf, the base being acute in the former and not acute in the latter. I have been able to examine more material than he cites and find that this distinction, along with that of the size of the leaf, is not a consistent one. The plants are lianas or small trees with scandent branches and, as such, one might expect the enormous leaf variation that is present. The range of leaf size and shape claimed for the species which have been proposed can be found in a single collection (*Klug* 2967 or *Krukoff* 5021) and frequently

on a single sheet (*Smith 3591*, NY). In these, the mature leaves may vary from 10 to 28 cm. in length and the base from acuminate to rounded or subcordate. For this reason I also place *M. Poeppigiana* in the synonymy of *L. cordata*. The other name, *L. Vellozii*, was supplied by Miers when he considered the epithet *cordata* to be inappropriate.

In Baillon's original description of *M. Poeppigiana* he cites the flowers as being polygamous. In most of the specimens that I have seen the flowers are perfect; however, there is a strong tendency for reduction of the pistil to a condition where there are three almost uniform styles. When this occurs the stamens are usually stouter and the pollen very abundant in the anthers. On the other hand, certain flowers show a tendency to reduce the stamens to poorly developed structures with very little pollen in the anther sacs. In these instances, the pistil usually has one well developed style with two rudiments scarcely evident.

Some of the previous monographers of this genus have interpreted the glabrous cylindrical or columniform base that is frequently present on the ovary as a disk and have considered it comparable to that found in *Mappia*. Examination of considerable material easily shows that such is not the case. The tissue of this base is not distinguishable from the rest of the ovary and very commonly is reduced in size and is scarcely evident.

The occurrence of hairs in the locules of this genus is unusual among the fruits of this family. I have found them only in *Ottoschulzia* among other genera. In the flowering condition the hairs are widely separated, long, and usually straight. The walls of these hairs are smooth and quite thick and their bases are usually enlarged.

Species Excluded

Leretia glabrata Sleumer, Notizbl. **15**: 245. 1940 probably = **Pleurisanthes parviflora** (Ducke) Howard.

Sleumer compares his new species with *L. parviflora*, which I had previously referred to the genus *Pleurisanthes*. It seems strange that Sleumer did not recognize this relationship, since he also described a new species of *Pleurisanthes*. Nevertheless *L. glabrata*, according to Sleumer's description, does not have the characters of the genus *Mappia* (*Leretia* sensu Sleumer), as the pedicels are bracteate and the petals are glabrous within. Sleumer does not mention a foliaceous disk, nor does he describe an articulation below the calyx, both of which are also characteristic of *Mappia*.

From the description given I cannot distinguish *L. glabrata* from *Pleurisanthes parviflora* and so, until I can examine the type, I tentatively refer Sleumer's species to the synonymy of *Pleurisanthes parviflora*.

Leretia paniculata Mart. Fl. Bras. **7**: 17. 1856 = **Citronella paniculata** (Mart.) Howard, Jour. Arnold Arb. **21**: 473. 1940.

Leretia parviflora Ducke, Arch. Jard. Bot. Rio **4**: 119. 1925 = **Pleurisanthes parviflora** (Ducke) Howard, Jour. Arnold Arb. **21**: 482. 1940.

Mappia Jacquin

Mappia Jacquin, Hort. Schoenbr. **1**: 22, t. 47. 1797; Kew Bull. **1940**: 111. 1940, as *nomen conservandum*; Miers, Ann. Mag. Nat. Hist. II. **9**: 393, in part. 1852;

Contrib. **1**: 62, in part. 1851-61; Baillon, *Adansonia* **3**: 367. 1862-3; Hist. Pl. **5**: 328, in part. 1874; Engl. Nat. Pflanzenfam. III. **5**: 249. 1893; Baehni, *Compt. Rend. Soc. Phys. Hist. Nat. Genève* **53**(1): 33. 1936; *Candollea* **7**: 171, in part. 1936.

Trees and shrubs; branches terete; leaves alternate, petiolate, the petioles shallowly sulcate, the lamina entire, the margin slightly revolute, commonly with pores in the axils of the veins on the dorsal surface; inflorescence axillary, cymose or corymbose, the flowers articulated to short ebracteate pedicels; flowers perfect, 5-parted, the calyx patelliform, minutely toothed; petals valvate, strigose or glabrate outside, villose inside, inflexed apex short, glabrous; stamens free, the anther sacs oblong, longitudinally dehiscent, introrse, filament basally attached, not arcuate, filiform, fleshy, scarcely flattened; pistil symmetrical, the ovary hirsute or glabrous, the disk fleshy, hirsute or glabrous on the margin and inside but always glabrous outside, the ovary one-celled; ovules two, anatropous, pendant from the apex of the locule; drupe with a thin putamen, seed one, albuminous, the cotyledons not displaced laterally, their margins superimposed.

TYPE SPECIES: *Mappia racemosa* Jacq.

DISTRIBUTION: Greater Antilles, Mexico, Panama.

Key to the species

Ovary and disk glabrous; petals glabrous outside; inflorescence to two-thirds the length of the oblanceolate leaves *M. mexicana*

Ovary at least sparsely pubescent; petals pubescent outside at least at the apex.

Leaves narrowly lanceolate, without pores in the axils of the veins on the lower leaf surface; petals lanceolate; disk glabrous; pistil densely hirsute. . . . *M. angustifolia*

Leaves broadly lanceolate or oblanceolate; pores present in the axils of veins; petals oblong; disk densely hirsute inside and on the margins or glabrate; pistil densely hirsute to glabrous *M. racemosa*

Mappia mexicana Robins. & Greenm. *Amer. Jour. Sci.* III. **50**: 150. 1895; Standley, *Contr. U. S. Nat. Herb.* **23**: 689. 1923; Baehni, *Candollea* **7**: 176. 1936.

Leretia mexicana Sleumer, *Notizbl.* **15**: 245. 1940.

Shrub 1.5-3 m. in height; branches terete, youngest stems sparsely pilose; petioles 5-8 mm. long, strigose to pilose, densely so in the sulca; lamina subcoriaceous, oblanceolate or oblong-obovate, 7.5-10.5 cm. long, 1.5-3.5 cm. broad, short-acuminate to rounded or obtuse at apex, cuneate at base, glabrous and shining above, when young sparsely pilose below at least towards base and becoming glabrate, the veins 6-7 pairs, weakly developed, slightly arcuate, anastomosing at margins; inflorescence with peduncles 2-6 cm. long, sparsely pilose, with several strigose bracts on the lower portion, the corymbs many-flowered, 2-3 cm. in diameter, the pedicels 1-2 mm. long, frequently glabrous, ebracteate, the calyx sparsely strigose or frequently glabrous, minutely toothed; petals moderately fleshy, oblong, 3-3.2 mm. long, 1-1.2 mm. broad at maturity, glabrous without, glabrate within or sparsely villose, the inflexed apex very short; stamens 2.5-3 mm. long, the anthers oblong, 1-1.2 mm. long, the anther sacs parallel, the filaments slightly flattened, the connective frequently extended to an inconspicuous tip; pistil 2 mm. in diameter at anthesis, glabrous, the style scarcely evident, the stigma capitate, the disk fleshy, 5-lobed, glabrous; fruit ovoid or ellipsoid, 1-5 cm. long, 1 cm. wide and 0.7 cm. thick, slightly flattened, apex slightly umbonate, base rounded or truncate, the funicle in the mesocarp, crescent-shaped in section; seed 1 cm. long, 0.7 cm. wide and

0.5 cm. thick, the raphe strap-shaped, the embryo three-quarters the length of the seed, the cotyledons ovate, 5 mm. long, the radicle cylindrical, 2 mm. long.

TYPE LOCALITY: Micos, San Luis Potosí, Mexico.

ILLUSTRATION: Plate I.

DISTRIBUTION: Mexico.

MEXICO: San Luis Potosí: Micos, *Pringle 5094* (A, G); Tamaulipas: Tampico, *Pringle 6645* (A, G, NY, US), *Palmer 69* (US).

Robinson and Greenman based their species on a specimen cited "*Pringle 5494*." Baehni also cites this number as examined. Miss Davis cited that number as *Inga laurina* Willd. and this has been verified in the Gray Herbarium. The specimen of *Mappia mexicana* in the Gray Herbarium, which is presumably the type, bears the number 5094 and is listed as such by Davis (Life and Work of C. G. Pringle 547. 1936).

Superficially the two Pringle collections examined are strikingly different in leaf shape and the length of the peduncle. In addition, *Pringle 6645* has the inner surface of the petals persistently pubescent while *Pringle 5094* is glabrate. The petals are fleshy in both and frequently have a waxy outer surface. They commonly turn blue on drying. The stamens are unique in that frequently the anther sacs will drop off after maturing, so that the old flowers will have erect filaments and connectives with no indications of the anther sacs. The connective is longer than that of most species of *Mappia* and frequently extends to a small apex or point beyond the anther sacs; it is narrow and scarcely separates them. The filament is attached, slightly abaxially, to the base of the connective. The description of the fruit was compiled from the Palmer collection.

Baehni saw in this species a close relationship with the Old World species of *Nothapodytes*. However, more complete study shows its true relationship is with *Mappia racemosa* of the Antilles.

Mappia angustifolia Griseb. Cat. Pl. Cub. 119. 1866.

Leretia angustifolia House, Amer. Midl. Nat. 8: 62. 1922.

Shrub, the branches pubescent; petioles 0.8–1.2 cm. long, strigose, densely so in the sulca; lamina narrowly lanceolate, 7–11 cm. long, 1.2–1.5 cm. broad, attenuate at both ends, apex rounded, base cuneate, chartaceous, glabrous and shining above, sparsely pubescent below with malpighiaceae hairs with unequal arms, the midrib prominent, strigose, the veins very weakly developed, arching, anastomosing towards margin, without axillary pores; inflorescence 3–4 cm. long, cymose, few-flowered, axis strigose to pilose; calyx patelliform, membranaceous, five-toothed, sparsely pilose; petals lance-oblong, 4–4.2 mm. long, 1 mm. broad at maturity, weakly pilose on the upper third without, villose within, densest on the lower portion, the apex inflexed, glabrous, to 0.8 mm. long; stamens 3–3.2 mm. long at maturity, the anthers 1 mm. long, the anther sacs slightly diverging at base; pistil 2 mm. high at anthesis, the ovary densely hirsute, the style short, the stigma oblique, capitate, the disk fleshy, five-lobed, glabrous; fruit unknown.

TYPE LOCALITY: Oriente province, Cuba.

ILLUSTRATIONS: Plate II, figs. 1–3.

DISTRIBUTION: Cuba.

CUBA: Oriente: near Saltadera, Sept. 20, 1860, *Wright 2638* (G).

Wright's collection is the only one I have seen referred to this species. It is easily recognized by its narrow leaves, the absence of axillary pores, the few-flowered inflorescence, and the glabrous ovarian disk. Wright reported the flowers to be a greenish-white color.

Wright and Sauvalle (Fl. Cub. 21. 1873) have placed this species in the synonymy of *M. racemosa*. From a study of this single collection of *M. angustifolia* and a large number of specimens of *M. racemosa* I can only conclude that there are good differences between them.

Mappia racemosa Jacq. Hort. Schoenbr. 1: 22. 1797; Miers, Ann. Mag. Nat. Hist. III. 9: 394. 1852; Griseb. Fl. Brit. West Indies 1: 310. 1860; Fawcett and Rendle, Fl. Jam. 5: 39. 1926; Baehni, Candollea 7: 175. 1936.
Isacina dubia Macf. Fl. Jam. 1: 122. 1837.
Leretia racemosa House, Amer. Midl. Nat. 8: 62. 1922.
Mappia affinis Miers, l.c. 395. 1852; Contrib. 1: 64. 1851-61.

A large bush or tree to 11 m. high, trunk diameter to 30 cm., the branches glabrous, terete or angular; petioles 12-25 mm. long, slightly strigose in the sulca, becoming glabrate; lamina lanceolate, oblanceolate or oblong, 10-19 cm. long, 3-5 cm. broad, apex acuminate to sharp-pointed or rounded, base acute to cuneate, glabrous, thinly coriaceous, dark green, rarely shining above, lighter below, the midrib canaliculate above, prominent below, the veins 7-9 pairs, inconspicuous above, weakly developed below, diverging obliquely, scarcely arcuate except near margin, inconspicuously anastomosing, the axillary pores more or less developed; inflorescence cymose or corymbose, the peduncles one and one-half to several times the length of the petiole, densely pilose to glabrate, bearing several spirally arranged densely hirsute bracts at the base, few- to many-flowered, the pedicels short; calyx patelliform, five-toothed, sparsely strigose with the hairs usually aggregated at the teeth, 1.5-2 mm. in diameter, 0.3-0.8 mm. high; petals lanceolate to oblong, reflexed, 3-4.5 mm. long and 0.9-1.1 mm. broad at maturity, densely strigose to glabrate without, within abundantly pilose or hirsute, the hairs frequently aggregated in the lower third, inflexed apex glabrous; stamens 2.5-4.5 mm. long at maturity, the filament rarely flattened at base, the anthers oblong, 1 mm. long, slightly diverging at base, the connective two-thirds the length of the anther; pistil 2-3 mm. high at anthesis, densely hirsute to glabrate, the stigma capitate, truncate to oblique, frequently bilobed, the style short, glabrous, the disk fleshy, hirsute on the edge and within and glabrous without to glabrate; lobes 0.2-0.3 mm. high; fruit ellipsoid, 1.4-1.6 cm. long, 0.9-1.1 cm. wide, tapering to the base or rounded, apex umbonate, mesocarp moderately fleshy or fibrous, the putamen smooth or slightly rugose; seed to 11 mm. long, the embryo nearly equal to the length of the seed, the cotyledons ovate, strongly palmately trinerved, the radicle short, conical or cylindrical, the endosperm with abundant oil cells.

Key to the varieties

- Fruit 1.7-2.5 cm. long, ellipsoid, tapering at base, mesocarp fibrous, not fleshy; leaves lanceolate, acuminate to a sharp pointed apex; pistil and disk usually glabrous or sparsely pubescentvar. *typica*
Fruit 1.2-1.7 cm. long, globose, base rounded, mesocarp fleshy; leaves oblanceolate, apex rounded or acute with rounded tip; pistil and disk hirsute.var. *brachycarpa*

Mappia racemosa var. **typica** var. nov.

Leaves lanceolate, apex acuminate to a sharp rarely rounded tip; inflorescence at least twice the length of the petiole, sparsely pubescent to glabrate; petals sparsely pubescent without; pistil essentially glabrate, disk usually glabrate; fruit ellipsoid, apex acute with an umbonate tip, base tapering, mesocarp fibrous, not very fleshy.

TYPE LOCALITY: Jamaica.

ILLUSTRATIONS: Jacq. Hort. Schoenbr. 1: t. 47. 1797; Valetton, Crit. Overz. Olac. pl. 5, fig. 25. 1886; Baehni, Candollea 7: pl. 4, fig. 1, D-E. 1936.

DISTRIBUTION: Jamaica, Cuba (Oriente), Porto Rico, Panama (?).

JAMAICA: Green Valley, *Harris 5387* (US), *Harris 6511* (FM, NY); Peckham woods, Upper Claredon, *Harris 11193* (NY); Schwallenburgh, St. Ann, *Harris 7043* (A, G, NY, US); Grier park, St. Ann, *Alexander* (ex Herb. Prior, NY); Santa Cruz Mts., Stauruane Hills, *Britton 1304* (NY); without locality, *Hart 575* (US), *MacFayden* (G). CUBA: Oriente, Josephina, Hiazo, *Wright 1578*¹ (G, US); locality not determined, *Wright 1389* (NY). PORTO RICO: N. L. and E. G. *Britton 9911* (NY). PANAMA: Bocas del Toro, region of Almirante, Flat Rock, *Cooper 563* (FM, NY, US).

Mappia racemosa var. **brachycarpa** Griseb. Cat. Pl. Cub. 119. 1866.

Lerettia racemosa (Jacq.) House var. *brachycarpa* (Griseb.) Sleumer, Notizbl. 15: 245. 1940.

Leaves oblanceolate, apex rounded or acute with rounded tip, base cuneate; inflorescence rarely twice the length of the petioles, usually strigose to pilose; petals densely to sparsely strigose without, densely pilose within; pistil densely hirsute, disk hirsute on the margin and frequently so within, rarely sparsely pubescent; fruit globose or slightly flattened, apex rounded and slightly umbonate, base rounded, the mesocarp fleshy.

TYPE LOCALITY: Cuba.

ILLUSTRATIONS: Plate II, figs. 4-13.

DISTRIBUTION: Cuba, Haiti (?).

CUBA: Oriente: *Wright 1578* (G), Farallon de la Perla, *Wright 1389* (G, NY), *Shafer 8770* (NY); Sierra Maestra, *Leon 10981* (NY). Santa Clara: Guabairo, Soledad, Cienfuegos, *Jack 6902* (A, NY, So), Buenos Aires, Trinidad Hills, *Jack 6979* (A, NY, So), *Jack 7233* (A, So, US), *Jack 8068* (A, NY, So, US). Havana: Valley Río Bacuranao, *Wilson and Leon 11608* (NY); Sierra de Anafe, *Leon 7575* (NY), *Wilson and Leon 2849* (NY), *Leon and Roca 7133* (NY); Managua, *Van Hermann 1294* (FM); Jamaica, Loma de Somorrostro, *Leon and Roig 11455* (NY). Pinar del Río: Sierra de Anafe, *Wilson 11496* (FM, NY, US), *Wilson and Leon 11300* (NY, US), *Wilson and Leon 11547* (NY), *Leon 2829* (NY); Sierra Mendoza, *Shafer 11130* (NY); Guanajay, Mt. San Gabriel, *Van Hermann 250* (FM, NY); Guanajay Mt., *Baker and Van Hermann 4265* (FM, NY), *Baker and Van Hermann 4273* (FM, NY). HAITI: Petit-Goave, Chapelle St. Michel, *Ekman 6602* (US); Gd. Goave, Morne Descassiers, *Ekman 9535* (US).

Specimens of *Mappia racemosa* exhibit an enormous series of variations in leaf size, shape and texture. Accompanying variation in the pubescence of the ovary and the disk has made attempts to define the limits of this species hazardous. I have available for study material from Cuba, Porto

¹This collection is a mixture. One sheet at the Gray Herbarium bears both var. *typica* and var. *brachycarpa*. The latter has not been recorded from the Oriente in recent collections and it is quite possible that this specimen has been added to the sheet without notation being made of that fact. The collection of *Wright 1389* must also be a mixture as Grisebach cites this number as the type for var. *brachycarpa*; however, the cited sheet from NY is var. *typica*.

Rico, Jamaica, Haiti, and Panama. The original figure and description by Jacquin was from a cultivated plant whose country of origin was unknown. Baehni and others have concluded it came from Jamaica. MacFayden described an *Ikacina dubia* from Jamaica which Miers reduced to the synonymy of *M. racemosa*. In 1866 Grisebach described a variety, from the collections of Wright from Cuba, on the basis of a character in the fruit. Grisebach had indicated this variety earlier (Pl. Wright. 1:191. 1860), without naming it. The variety is well marked and appears to be the common representative in the numerous recent collections from Cuba. The third name applied here is *Mappia affinis* Miers which was believed distinct, by that botanist, on the absence of axillary pores. These pores are usually present but vary considerably in degree of development. Often they are 3 mm. in diameter with orifices of 1 mm. or more, but as frequently they are scarcely noticeable and may have orifices visible only with a lens. There is no mention of the nature of the leaf apex in Miers' description, but I presume from the lanceolate shape that it is identical with var. *typica*.

Fawcett and Rendle describe and figure this plant as having a glabrous ovary and disk, as did Jacquin. After closely examining duplicates of the collections cited by Fawcett and Rendle, I have found that not all specimens have the glabrous condition. Actually a sparsely pubescent ovary and disk is by far the more common condition. The most reliable characters for distinguishing between the typical form and var. *brachycarpa* are in the fruits. The resemblance of the fruit of the Jamaican plants to that of *Lereticia* is striking. They are remarkably similar in shape and structure; however, the fruits of *Lereticia* are several times larger. In var. *typica* the drupe is flattened, rounded to an umbonate acute apex and narrowed to a cuneate base. The exocarp and mesocarp are thin and not fleshy. In dried condition these fruits never have the mesocarp distorted or squashed by pressing.

In var. *brachycarpa* the pistil and disk are usually densely strigose or hirsute with the hairs on the margin of the disk or, if extremely abundant, on the inside as well. The pubescence of the pistil is uniform and usually quite dense. This may approach the style or the style may be glabrous. The fruit is rounded at the base and subglobose in form, seldom tapering to the degree where it could be confused with var. *typica*. The mesocarp is fleshy so that, in practically all of the specimens I have seen, it has been squashed in pressing and the fruit is in an imperfect condition. The putamen is essentially smooth outside and is thicker than the more tenuous endocarp found in var. *typica*.

The occurrence of var. *typica* in Jamaica and the Oriente province of Cuba is supplemented by a recent collection from Panama. Except in the size of the leaves, which may be to 30 cm. long, these flowering specimens cannot be satisfactorily distinguished from var. *typica*. Therefore, until the fruit is known, it is advisable to place this collection here, even though the pistil and disk are more pubescent than the average. A collection from Porto Rico is also to be placed here. The leaves of this flowering specimen

are 14–19 cm. long and 6–8 cm. broad with both ends tapering and the apex sharp pointed. The pistil is sparsely pubescent with the disk glabrous.

Ekman's specimens from Haiti, cited in his flora, are both sterile but appear to be close to var. *brachycarpa*. So few collections are available from the Antilles outside of Cuba that an attempt must be made not to over-emphasize the differences in appearance of these collections until enough material is available to evaluate them correctly. Jack collected a large series of plants from one locality in Santa Clara province of Cuba and these numbers show the remarkable differences which might be expected in the species.

Both varieties appear to be plants of higher altitudes between 1500 and 3600 feet.

Species Excluded

Mappia origanoides (L.) House, Amer. Midl. Nat. **8**: 62. 1922 = *Satureja origanoides* L.

Mappia philippinensis Merr. Phil. Journ. Sci. **26**: 467. 1925 = *Apodytes cambodiana* Pierre.

Mappia senegalensis (Juss.) Baill. Hist. Pl. **5**: 277. 1874 = *Icacina senegalensis* Juss.

Nothapodytes Blume

Nothapodytes Blume, Mus. Bot. Lugd.-Bat. **1**: 248. 1850; Baillon, *Adansonia* **3**: 90. 1862–3.

Neoleretia Baehni, Compt. Rend. Soc. Phys. Hist. Nat. Genève **53**(1): 33. 1936; Candollea **7**: 177. 1936.

Mappia Jacq. Sect. *Trichocrater* Miers, Ann. Mag. Nat. Hist. II. **9**: 395. 1852; Engl. Nat. Pflanzenfam. III. **5**: 249. 1893.

Trees and shrubs, branches usually angular; leaves alternate or sub-opposite, the margins entire, subrevolute; petioles broadly and shallowly canaliculate; inflorescence terminal, rarely axillary, cymose or corymbose, flowers articulated to short ebracteate pedicels; calyx cupular, slightly five-toothed or lobed; petals 5, valvate, strigose or rarely short papillate-pubescent without, villose within, inflexed apex usually glabrous; stamens 5, free or rarely cohering by pressure to the base of the petals, the anther sacs ovate, longitudinally dehiscent, introrse, diverging at base, separate throughout their length, with a basal abaxial reflexed pulviniform appendage more or less cohering to the filament, connective about one-half the length of the anther, the filament fleshy, filiform, commonly flattened and slightly dilated at base, incurved at apex and attached dorsally to the anthers at the base of the connective; pistil symmetrical, the ovary hirsute, the style filiform to stout, the stigma capitate, truncate or oblique, the disk fleshy foliaceous, hirsute or glabrous within and on the edge, glabrous without, ovary one-celled, ovules two, anatropous, pendant from near the apex; drupe with a thin, rugose or smooth putamen, seed one, albuminous.

TYPE SPECIES: *Nothapodytes montana* Blume.

DISTRIBUTION: India, Malaysia, and the Philippine Islands.

Key to the species

Disk glabrous.

Leaves glabrous, obovate to lanceolate, base cuneate, costa horizontal; inflorescence commonly axillary, stigma oblique. Java *N. montana*

Leaves sparsely hirsute, elliptic to oblong-elliptic, base acute, veins gracefully arcuate; inflorescence terminal, usually two to the shoot apex, stigma truncate, concave. China (Yunnan), Siam *N. dimorpha*

Disk pubescent.

Lamina unequal at base, leaf scars lunar or triangular, conspicuous, petiole to 5 cm. long; young branches strigose; calyx not ciliate, petals short strigose outside, disk hirsute on the margin and inside; drupe with rounded apex, putamen rugose, endosperm with a foetid odor, embryo about one-half the length of the seed. India and Malaysia *N. foetida*

Lamina equal at base, leaf scars circular, inconspicuous, petioles short, 1–2.5 cm. long.

Leaves attenuate at apex, petiole 1–2 cm. long; branches strigose; calyx ciliate-margined, petals commonly short-papillate without at apex and on margins, disk glabrous on margin; drupe umbonate at apex, slightly flattened, putamen rugose, endosperm with foetid odor, embryo about one-half the length of the seed. Southwestern China *N. pittosporoides*

Leaves rounded at apex, petiole 1–2.5 cm. long; branches glabrous; calyx not conspicuously ciliate-margined, petals densely short-strigose without, disk conspicuously ciliate on margin; drupe rounded at apex, rarely slightly flattened, putamen smooth, endosperm not foetid, embryo nearly as long as the seed. Hainan *N. obtusifolia*

Nothapodytes montana Blume, Mus. Bot. Lugd.-Bat. **1**: 248. 1850.

Mappia montana Miers, Ann. Mag. Nat. Hist. II. **9**: 398. 1852; Contrib. **1**: 67. 1851–61; Miq. Fl. Ind. Bat. **1**: 790. 1856; Valetton, Crit. Overz. Olac. 183. 1886; Koorders and Valetton, Bijdr. Booms. Jav. **5**: 143. 1900; Koorders, Excurs. Jav. **2**: 532. 1912.

Small tree; leaf blade obovate to lanceolate, 10–14 cm. long, 3.5 cm. broad, thinly coriaceous, dark and shining above, paler beneath, glabrous, apex obtusely acuminate, blade attenuate to a cuneate base, veins prominent, reticulate, costa horizontal; inflorescence corymbose, axillary or terminal, pedicels short, ebracteate; buds sericeous; calyx cupular, obscurely five-toothed, persistent; petals linear; stamens with filiform filaments, the anthers oblong, dorsally affixed; pistil hirsute, the ovary ovoid, the style filiform, the stigma capitate, oblique, emarginate, the disk fleshy, lobed, glabrous on both sides; drupe fleshy, ellipsoid, one-seeded. (Description compiled from Blume and Valetton.)

TYPE LOCALITY: Western Java.

ILLUSTRATION: Valetton, Crit. Overz. Olac. *pl.* 5, fig. 28. 1886.

DISTRIBUTION: Valetton (l.c. 183) reports this species from Sumatra in addition to the type locality in Java.

I have seen no material of this species. The type was in the herbarium at Leiden, and Koorders and Valetton apparently saw a second collection.

Blume described this as the type species of a new genus. Miers reduced the genus and placed *Nothapodytes* in *Mappia* as a subgenus. Benthham and Hooker referred it to *Apodytes*; however, Beccari disagreed and considered the species under *Mappia*. Engler has followed Miers. Baehni concluded the species could not belong either in *Apodytes* or *Mappia* but he failed to recognize its similarity to his new genus *Neoleretia*. Sleumer has shown these two genera to be the same and referred the species of *Neoleretia* to the genus *Nothapodytes*.

There is an important difference between the descriptions of Miers and Valetton. Miers reports the disk around the pistil to be long-pubescent on

the inside. Valetton reports and figures the disk as glabrous. Obviously another report is needed from someone who has access to this material. If it is glabrous, as Valetton reports, the species is similar to *N. dimorpha*, yet the other characters maintain the identity of each species. If, however, the disk is hirsute, the plant would closely approach the condition found in *N. obtusifolia* and perhaps *N. pittosporoides* and may replace one or the other.

Nothapodytes dimorpha (Craib) Sleumer, Notizbl. **15**: 247. 1940.

Mappia dimorpha Craib, Kew Bull. **1926**: 347. 1926.

Neoleretia dimorpha Baehni, Candollea **7**: 178. 1936.

Tree to 10 m., stems terete but longitudinally striate and ridged, young branches hirsute, becoming glabrate; leaves alternate, or opposite at the terminal dichotomies of the shoots; petioles 3–5 cm. in length, wiry, deeply canaliculate above, sparsely hirsute; lamina elliptic to oblong-elliptic, 18 cm. long to 8.7 cm. broad, membranaceous, paler in color below, apex acuminate, base acute, midrib and veins densely short-pilose or crispate above, slightly prominent, sparsely to densely hirsute below, the veins 8–10 pairs, prominent, gracefully arcuate, anastomosing near margin, the margin ciliate; inflorescence terminal, frequently two from the shoot apex, the axis appressed-crispate or strigose; calyx campanulate, 3 mm. in diameter, 2 mm. high, moderately lobed, the lobes to 0.8 mm. high, sparsely strigose; petals oblong, 4.5–6 mm. long, 1.2–1.5 mm. broad, densely strigose without, pilose within except at apex and base, inflexed tip 0.3 mm. long, frequently papillate; stamens 4.2–4.4 mm. long, the filaments slender, fleshy, 3–4 mm. long, the anther sacs 1–1.2 mm. long; pistil 4–4.5 mm. high at anthesis, the ovary 1–1.4 mm. in diameter, sparsely to densely hirsute, the style 2–2.8 mm. long, glabrous, the stigma capitate, truncate or concave at apex, the disk fleshy, crenulate-margined, frequently deeply lobed, glabrous, to 1 mm. in height; fruit not known.

TYPE LOCALITY: Sukotai, Siam.

ILLUSTRATION: Plate III.

DISTRIBUTION: Siam, China (Yunnan).

CHINA: Y u n n a n : Hills of Tso-si, *Maire* 239 (A).

The cited specimen consists of several flowering branch tips with a single mature leaf. The leaf is only 9 cm. long and 4.5 cm. broad with a petiole of 1.9 cm., much smaller than that cited for the type. However, all other characters are in agreement. This plant is also unusual in possessing two inflorescences at the apex of the shoot with the subtending leaves opposite. These inflorescences, with pedicels of 2 cm. and a diameter of 2 cm., are much smaller than those Craib described. Maire reports that the flowers are yellow and that the plant was collected at an altitude of 2450 m.

My material is inadequate and I have been forced to adopt my description from that given by Craib.

Nothapodytes pittosporoides (Oliv.) Sleumer, Notizbl. **15**: 247. 1940.

Mappia pittosporoides Oliv. in Hook. Ic. **18**: pl. 1762. 1888.

Neoleretia pittosporioides Baehni, Candollea **7**: 178. 1936.

Woody bush or rarely a tree, 1.5–5 m. tall, branches mostly green, terete, rarely angular, the leaf scars not conspicuous, circular, the youngest

branches strigose, becoming glabrate; petioles 1–2.2 cm. long, broadly sulcate above, commonly strigose at least in the sulca; lamina oblong or commonly oblanceolate, 10–15 cm. long, 2–4.5 cm. broad, thinly coriaceous, dark green and frequently shining above, lighter below, commonly turning black on drying, when young densely golden-strigose especially beneath, the midribs and veins commonly light yellow in color, commonly hirsute, glabrate at maturity, the veins 6–8 pairs, weakly developed and anastomosing; inflorescence axis frequently flattened, hirsute; calyx campanulate, 3 mm. in diameter, membranaceous, ciliate on margins and sparsely strigose without, five-toothed, teeth deltoid, to 1.2 mm. long, increasing slightly in fruit; petals oblong, 6.3–7.4 mm. long, 1–2.1 mm. broad, inflexed apex fleshy, 1 mm. long, strigose without, commonly papillate on apex and margins, long-villose within; stamens 5–6 mm. long, the filaments 4–5 mm. long, slightly thickened at base, the anthers ovate, 1–1.3 mm. long; pistil 3.5–4 mm. high, disk fleshy, irregularly lobed or deeply crenulate, glabrous without and on margin, sparsely hirsute within, persistent in the fruit, the ovary evenly hirsute, 1.1–1.4 mm. diameter at anthesis, indistinctly truncated; drupe ellipsoid to oblong-ovoid, slightly flattened, 1–1.8 cm. long, 0.6–0.8 cm. in diameter, distinctly umbonate at apex, commonly minutely pubescent at maturity, the putamen thin, rugose, the endosperm with noticeable foetid odor, the embryo about one-half the length of the seed, the cotyledons ovate, 4.5 mm. long, 3.5–4 mm. broad, the radicle cylindrical, 2 mm. long.

TYPE LOCALITY: Ichang, Hupeh, China.

ILLUSTRATIONS: Hook. Ic. **18**: *pl.* 1762. 1888; Baehni, *Candollea* **7**: *pl.* 4, *fig.* 2, A–B. 1936.

DISTRIBUTION: Western China (Hunan, Hupeh, Kwangtung, Kweichow, Szechuan).

CHINA: H u n a n : Hsikwangschan, Hsinhwa, *Handel-Mazzetti* 778 (A); Yangshan Changning Hsien, *Fan and Li* 179 (A). H u p e h : Ichang, *Henry* 3990 (type coll. NY), 3536 (A, G, US), 3537a (G), 4118 (A, G, US); Hsing-shan, Chang lo Hinen, *Wilson* 3296 (A, G, US). K w a n g t u n g : Yu-yuen, *Ko* 52863 (A). K w e i c h o w : Liang Feng Yah, *Steward, Chiao and Cheo* 241 (A, NY, US). S z e c h u a n : Mt. Omei, *Wilson* 4945 (A), *Wang* 23215 (A); Mt. Weol, *Wilson* 4440 (A); Mt. Wal, *Wilson* 3295 (A, G, US); Kientschang, *Handel-Mazzetti* 1047 (US); Yu-chi k'on, *Smith* 2360 (A); no locality given, *Wilson* 3234 (A).

This species is limited to western China. Handel-Mazzetti reports its habit to be rocky slopes or cliffs, Wilson reports thickets, and Steward mentions wooded slopes. The substratum, according to Handel-Mazzetti, is usually calcareous or schistose. The species grows at an altitude of from 650–1750 m. and is a bush (60 cm. ex Handel-Mazzetti) or a small tree (5–10, rarely to 20, feet, ex Wilson). The oblanceolate leaves are usually clustered at the apex of the shoots. The inflorescence has fewer flowers than most species of the genus, and these flowers are yellow and have a foetid odor resembling that of *N. foetida*. This odor is also present in the endosperm of the seed. The fruit is red when mature and usually turns black on drying. The calyx enlarges slightly with the fruit and remnants of the disk are also present. The endosperm is divided into two concentric zones with the outer usually of a harder consistency.

Nothapodytes obtusifolia (Merrill) comb. nov.*Mappia obtusifolia* Merr. Lingnan Sci. Jour. **14**: 28. 1935.

Woody bush or tree, 3–24 m. in height, diameter of trunk to 35 cm., the bark gray, the branches terete, glabrous; leaves alternate, the upper ones frequently aggregated near the tip of the shoot, almost opposite; the petioles 1.2–2.5 cm. long, terete or obscurely flattened, glabrous, olive-brown in color, the lamina oblanceolate-oblong or rarely oblong, 9–18 cm. long, 3–6.5 cm. broad, chartaceous to thin-coriaceous, olive green on both sides, not darkening on drying, glabrous, apex obtuse or rounded, base cuneate to acute, the veins 7–8 pairs, only slightly and equally developed on both sides of the midrib, forking abruptly midway to the margins, laxly reticulate; cymes 3–5 cm. broad on peduncles 3–4 cm. long, the axes slightly flattened, moderately strigose; calyx campanulate or spreading, 2–2.3 mm. in diameter, 1.5 mm. high, strigose on surface and slightly so on margins, weakly 5-toothed; petals oblong to lanceolate, 6.9–7.2 mm. long, 2.1–2.5 mm. broad, densely short-strigose without, weakly hirsute within, the inflexed tip 0.5 mm. long; stamens 5.5–6.4 mm. long, the anther sacs ovate-oblong, 2–2.7 mm. long and 1.5 mm. wide, the filament 4–5 mm. long; pistil 3–3.7 mm. high, the ovary 1 mm. in diameter, hirsute, the style stout, 2 mm. long, more or less hirsute but commonly glabrous below the stigma, the stigma oblique, bilobed, the disk thin, fleshy, 0.3 mm. high, glabrous without but densely ciliate on margin, hirsute within, margin crenulate, never lobed; drupe oblong-ovoid, 9–13 mm. long, 6–9 mm. in diameter, circular in cross-section, rarely flattened, moderately hirsute when young, becoming glabrate, the putamen thin, almost smooth; seed 7.8–9 mm. long, the ovate cotyledons 5.2–6 mm. wide, cordate at base, strongly three-nerved, the radicle cylindrical, 2.3 mm. long.

TYPE LOCALITY: Ngai district, Hainan.

ILLUSTRATIONS: Merrill, Lingnan Sci. Jour. **14**: 29. 1935.

DISTRIBUTION: China (Hainan).

CHINA: H a i n a n : Yaichow, alt. 1700 feet, *How* 70623 (A, NY, US); alt. 1100 feet, *Chun and Tso* 44674 (A, NY, US); Yai-hsien, *Lau* 5794 (A); Naam Shan Leng, Ngai district, *Lau* 233 (type NY, US).

This plant is reported to have fragrant flowers and so is quite in contrast with *N. foetida* and *N. pittosporoides*. The fruit is red and the endosperm lacks the foetid odor found in the other species. This species was overlooked by both Baehni and Sleumer.

Nothapodytes foetida (Wight) Sleumer, Notizbl. **15**: 247. 1940.*Stemonurus foetidus* Wight, Ic. **3**: 955. 1843–5.*Mappia foetida* Miers, Ann. Mag. Nat. Hist. II. **9**: 395. 1852.*Mappia oblonga* Miers, l.c. 396.*Mappia ovata* Miers, l.c. 396.*Mappia Gardneriana* Miers, l.c. 396.*Mappia Championiana* Miers, l.c. 397.*Mappia Wightiana* Miers, l.c. 397.*Mappia tomentosa* Miers, l.c. 397.*Mappia tomentella* Miers ex Valetton, Crit. Overz. Olac. 183. 1886.*Mappia cambodiana* Pierre, Fl. For. Cochinch. **17**: 267. 1892.*Neolaretia foetida* Baehni, Candollea **7**: 177. 1936.

Trees to 15 m. in height; branches conspicuously angular with large triangular leaf scars; petioles 1.4–5.3 cm. long, averaging 3 cm., strigose espe-

cially in the sulca; lamina variably elliptic-ovate or lance-oblong, 10–20 cm. long, 5–12 cm. broad, membranaceous or moderately coriaceous, at least the young leaves turning black on drying, sparsely pubescent above, glabrate below or sparsely pilose with the veins hirsute or tomentose, attenuate at apex, the base attenuate or rounded, unequal, the nerves 7–8 pairs, prominent below, scarcely evident above, the peduncles and rachises of inflorescences flattened or angled, crispate- or strigose-pubescent; calyx campanulate, 2.4–3 mm. in diameter, the five teeth rarely exceeding 0.2 mm. in height, strigose or glabrate; the petals lance-oblong, 4.2–5 mm. long, 1.5–1.8 mm. broad, appressed-strigose without, villose within, the inflexed apex with short-villose pubescence; the filaments 3.1–4 mm. long, the ovate anther sacs 1–1.2 mm. long, the disk slightly lobed, glabrous without, hirsute on the margin and inner surface, 0.2–0.3 mm. high, the ovary 1–1.5 mm. in diameter at anthesis, densely hirsute or pubescent in definite lines, the style stout, 1.1–1.4 mm. long, densely hirsute to glabrate, the stigma capitate, truncate or bilobed and oblique; drupe oblong-ovoid, 1–2 cm. long, 0.8–1 cm. in diameter, black, commonly minutely pubescent, the putamen thin and woody, the endosperm with a foetid odor, the embryo usually one-half the length of the seed, the cotyledons ovate, usually displaced laterally, their margins not superimposed.

TYPE LOCALITY: Nilgiri Hills, India.

ILLUSTRATIONS: Pierre, Fl. For. Cochinch. 17: 267, as *Mappia cambodiana*. 1892; Beddome, Fl. Sylv. t. 141. 1871; Brandis, Indian Trees, fig. 70. 1915; Fyson, Fl. South India Hill Stations 2: t. 81. 1932; Fyson, Fl. Nilgiri and Pulney Hill-tops 2: 58. 1912; Baehni, Candollea 7: pl. 4, fig. 2, D–F, as *Mappia foetida*. 1936; Wight, Ic. Pl. Ind. Or. 3: 955. 1843–5; Spicil. Neilgher. 1: 23, as *Stemonurus foetidus*. 1851; Valetton, Crit. Overz. Olac. pl. 5, fig. 26. 1886; Talbot, For. Fl. Bombay 1: 266, as *Mappia oblonga*. 1909; Miers, Contrib. Bot. 1: pl. 8. 1851–61; Valetton, Crit. Overz. Olac. pl. 5, fig. 27, as *Mappia ovata*. 1886; Schnizl. Icon. 4: 233a, figs. 9–11, as *Mappia tomentosa*. 1886.

DISTRIBUTION: Southern India (Western Ghats, Mysore), Ceylon, Cambodia, Botel Tobago.

SOUTHERN INDIA: Penn. Orient., Wight 431 (G, NY); Nilgiri hills, King (US 263706); Gardner (NY); Hooker and Thomson (G); Ootacamund, Oct. 17, 1921, Wilson (A), Oct. 16, 1921, Wilson (A); Pulney hills, Kodaikanal region, Anglade collection s.n. (A); Malabar, Concan, etc., Stocks, Law, etc., Hooker and Thomson Herb. (G). CEYLON: Gardner 98 (G, type coll. of *Mappia Gardneri*); Gardner 99 (G, NY, type coll. of *Mappia ovata*); Thwaites 492 (G, NY); near Badulla, Silva 24 (NY). BOTEL TOBAGO: Feb. 7, 1920, S. Sasaki (A).

This range is extremely wide. I have not seen the Cambodian material of Pierre. The plant from Botel Tobago was misidentified in the herbarium, this fruiting specimen is very similar to specimens of *N. foetida* from Ceylon and India, particularly those of Gardner 99, Silva 24, Wight 492, and Wilson s.n. cited above. More collections from the middle of this range with more detailed habitat and altitude notes are quite desirable.

NATIVE NAMES: Stinking may tree, gur, halgur, ganera (Nairne); stinking lamp, Ganda pang (Miers); gandapana (Trimen); gandaoanapas (Thwaites); Kodsā, hedare (Talbot); ghānera (Cooke); Kala gaura, Arali (Brandis).

The majority of writers since Miers have tended to lump *M. Gardneriana*, *ovata*, *tomentosa*, and *cambodiana* under *foetida* as the specific differences

are poor. Thwaites and Trimen considered them, in part, as varieties.

In the course of the present study differences were observed, in the material at my disposal, which have not been mentioned in the literature. The significance of these differences cannot be determined from limited material but it is deemed advisable to indicate them.

The species here included were established on the basis of leaf size, shape and pubescence. These are acknowledged to be variable by Trimen, Thwaites, Baehni, Fyson, Wight and others. For example, the glabrate petiole may vary in length, in one specimen (*Gardner 99*, isotype of *M. ovata*) from 1.5 cm. to 5 cm., but the average length for petioles of this complex is 3 cm. In my material the base of the leaf is always unequal and the pubescence is deciduous upon maturity of the leaf. Most of the juvenile leaves are pubescent on both surfaces. The midribs and veins alone possess hairs on the upper surface of the older leaves and on the lower surfaces bear more hairs than the lamina. In the specimens I have seen which had been identified as *M. tomentosa* the pubescence is dense and crispose with the hairs limited to the veins and veinlets. In *Gardner 98* tufts of hairs are present in the axils of the veins and the midrib in mature leaves. The pubescence on the inflorescence is more striking, as it is variable in length and color as well as density of the hairs. The calyx teeth show extremes of development and of indument. The pubescence on the inside of the petals is late in developing. If the buds are small the hairs may be entirely suppressed and an uneven development may occur if the stamens are tightly appressed to the petals. Thus it is possible, at different stages of petal- and bud-development, to have long and apparently fully developed hairs in some portions and glabrous areas in other regions of the petals. When mature the petals are reflexed and, usually, the indument is uniformly developed. The stamens are commonly as long as the petals. In *Gardner 98*, however, the filaments fail to elongate and the pollen content of the thecae is much reduced.

Pierre makes no mention of a disk in his description, nor does he figure it in the plate of *M. cambodiana*. Baehni, however, examined authentic material, and so I assume that the synonymy is correct.

All fruits of this group are pubescent when young. This may persist to maturity or the fruit may be strictly glabrate when mature. A thin, commonly rugose, putamen exists in this group which has two ridges developed lateral to the funicle. The single seed usually fills the locule but the remnants of the other ovule may frequently be found. There is a differentiation of the foetid endosperm into a hard and usually darker outer layer and a lighter colored but frequently even harder inner layer. The lateral displacement of the cotyledons is of particular interest. In *Thwaites 492* the cotyledons are regularly orbicular in shape and only slightly displaced laterally. In the *Stocks, Law* specimen the cotyledons have a very irregular or lobed shape and are greatly displaced with the median line of the cotyledon being as much as 30° to 45° from the center. In the *Anglade* specimen labelled *M. tomentosa*, the cotyledons are likewise strongly displaced,

but here the shape is regular, ovate or oblong. These variations in displacement and form appear in a regularly increasing series relative to the length of the seed; that is, the seeds of *Thwaites* 492 are ovoid and about as wide as long while those of the *Anglade* specimen are oblong and twice as long as wide. The *Stocks, Law* specimen is intermediate. I cannot determine the significance of this variation from the few fruiting specimens I have. Pierre says that Miers' species can be separated on leaf size and fruit characters, but does not elaborate on this statement. Neither Baehni nor Sleumer, who both lump Miers' species, comment on this. While the size of the fruit will vary on the same sheet (possibly stages of development), the embryo form, in those I have examined, is constant. The embryo, which is commonly as large as the seed, is usually oriented at right angles to the raphe. The funicle is flattened and is relatively thin. It is located in the mesocarp between projecting ridges of the putamen. It runs the length of the fruit in this manner and enters the locule very near the apex. The raphe descends the broad face of the seed, which is frequently slightly flattened, and terminates in a circular chalaza at the end opposite the micropyle.

The flowers are reported by Fyson to be "extraordinarily evil smelling." Miers says that the native name means "stinking lamp on account of the extremely foetid odor of the flowers." Gamble (Fl. Pres. Madras **1**: 196. 1915) has a key to the several species he recognizes, and distinguishes between these by the absence of a foetid odor in some. He also considers the texture of the leaves, i.e. membranaceous or coriaceous, as a significant difference and incorporates this in his key. Thwaites and Trimen have pointed out that this is a character varying with the altitude. Beddome also recognizes this and notes that the plants range in altitude from sea level to 7-8000 feet.

Species Excluded

Nothapodytes philippinensis (Merr.) Sleumer, Notizbl. **15**: 247. 1940.

Mappia philippinensis Merr. Phil. Journ. Sci. **26**: 467. 1925.

Ncoletetia philippinensis Baehni, Candollea **7**: 80. 1936.

Both Baehni and Sleumer ignored the glabrous condition of the inner surface of the petals in this species and allowed it to remain in the *Mappia* complex. Through the kindness of the curator of the herbarium of the Philippine Bureau of Science I was able to borrow and examine the type specimen of this plant. It must now be referred to the synonymy of *Apodytes cambodiana* Pierre, Fl. For. Cochinch. t. 267. 1892.

Humirianthera Huber

Humirianthera Huber, Bul. Soc. Bot. Genève II. **6**: 184. 1914; Baehni, Candollea **7**: 181. 1936.

Vines or shrubs with scandent branches, rhizomatous, the rhizomes or tubers large; leaves alternate, usually membranaceous, entire; flowers perfect, 5-parted, articulated at the base of the calyx to bracteate pedicels; calyx deeply lobed, the lobes frequently unequal in length; petals equal, ovate to lanceolate, valvate, appressed-pubescent without, villose or crispose-pubescent within, apex inflexed; stamens free, the filaments thickened at

base, attenuate towards apex and inflexed, the anther sacs subglobose to oblong, introrse, longitudinally dehiscent, the connective triangular, broadest at base and projecting beyond anther sacs; ovary hirsute, unilocular, the ovules two, anatropous, collaterally pendulous; style incurved, glabrous, the stigma small, capitate; fruit drupaceous, oval to globose, exocarp tenuous, mesocarp thick and fleshy becoming woody, the putamen housing a tubular funicular canal, the seed one, albuminous.

TYPE SPECIES: *Humirianthera ampla* (Miers) Baehni.

DISTRIBUTION: Brazil, Colombia, Venezuela.

Huber established this genus on material collected by Ducke in Brazil and gave the genus an appropriate name by indicating the superficial similarities of the stamens with those found in the Humiriaceae. The anther sacs of both the Humiriaceae and *Humirianthera* are small and diverge at the base. The connective is large and fleshy and characteristically continues past the anther sacs in a triangular extension. The filament is attenuate at the apex and inflexed before its attachment to the base of the connective. Neither Miers nor Engler mention these features in their description of *H. ampla*, although Baillon does. Apparently Valetton's work was overlooked by both Huber and Baehni, since he gives a good description of this connective and indicates the similarity to the Humiriaceae. Valetton maintained *H. ampla* as a species of *Leretia* as he was able to find in *L. cordata* a projection of the filiform connective as a slight tip beyond the oblong anther sacs. The width of this connective varies, and Valetton interpreted the condition found in *H. ampla* as an extreme development, i.e., widening and extension, of the sterile connective tissue. Baehni examined isotype material of *L. ampla* and *H. Duckei*, Huber's type species, and concluded that they were identical. I have only cited specimens of *H. Duckei* to compare with isotypes of *L. ampla* but I believe that Baehni is correct. The type species of the genus therefore, should be called *H. ampla* (Miers) Baehni.

The shape of the anthers is the single character upon which Huber and Baehni maintain this genus. While this character is most readily recognized, there are others which support the genus. The occurrence of stellate hairs is infrequent in the Icacinaceae and appears to be quite typical of the few genera which do have them. The presence of these clusters in *H. rupestris* and *H. crispula* and the tendency in *H. ampla* to have the hairs clustered is significant in characterizing the genus. The stellate cluster in *Humirianthera* consists of a single erect, thick, rugose-walled hair surrounded by a basal rosette of arching, smooth-walled hairs. The deeply lobed calyx, which is densely covered without with strigose or curved hairs, is easily recognized. The petals are strigose without and usually covered within with a dense tangled mat of crispate hairs or simply a dense pubescence of villose hairs.

Fruits are known only for *H. rupestris*. Since there is so little variation in the fruits within the genera of the Icacinaceae, it is safe to assume that those of the other two species will be similar when found. Ducke reports that the mesocarp is fleshy, but in a dried condition its texture is fibrous or

even woody. The putamen is smooth both inside and outside. The entire fruit is quite a bit larger than that found in any of the related genera, and the presence of single strigose hairs and stellate hair clusters on the mature fruit is characteristic.

The underground structures of the New World genera of the Icacinaceae are unknown. Such structures, especially of woody plants, are not readily obtained by collectors. There are, however, several reports of the root system of *Humirianthera* in the literature. Le Cointe, Ducke and others describe the plants as woody shrubs, or bushes, with rhizomes or tubers. The tuber may be up to 40 cm. in diameter and weigh nearly 100 kilos and, when powdered, may yield as much as 16 kilos of starch. These tubers contain a poisonous principle which is readily removed by repeated washings, after which the starchy material may be used for food. The fruits are reported to be the size of a hen's egg and these also contain starch. This type of underground system is unusual since most of the genera in this family are trees and shrubs. It is interesting to note that Hutchinson and Dalziel have reported similar tubers for *Ikacina* in tropical West Africa and Engler found a similar underground system in *Trematosperma*. Hutchinson and Dalziel also describe a washing process for the *Ikacina* tubers to remove the poison principle before they can be used. *Ikacina* is reported to have a habit similar to that found in *Humirianthera* while *Trematosperma* is a true liana. This same type of underground system might be expected in several other genera of the Icacinaceae with a similar bushy scrambling habit.

The genus now contains three species. These are limited to South America and are found mainly in the Amazon basin. The plants are reported growing in open locations on the edges of both primary and secondary forests which are not inundated. The closest relationship of this genus is with *Leretia*.

Key to the species

Petals glabrous in the lower third of the inner surface, this region usually fleshy and swollen into a ridge or flap, the entire plant bearing a characteristic red-brown stellate pubescence; leaves rhomboid, widest at the middle, veins arcuate but weakly if at all anastomosing at the margins; inflorescence terminal. *H. rupestris*

Petals pubescent almost to the base within, lacking the fleshy ridge or flap; veins of the leaves arcuate and strongly anastomosing at margin.

Inflorescence and leaves commonly simple-pubescent, becoming glabrate, hairs rarely gathered into small numbered clusters; pubescence on the inside of the petals straight or only slightly curly; leaves broadly lanceolate to elliptical, flat, base rounded; anther sacs when mature one-fourth to one-third the length of the anther *H. ampla*

Inflorescence and leaves stellate-pubescent, hairs yellow-brown; inside of the petals densely curly-crisp to base; leaves elliptic to orbicular, midrib commonly arching so that the pressed leaves are frequently plicate, base slightly cordate; anther sacs when mature one-half to two-thirds the length of the anthers *H. crispula*

Humirianthera rupestris Ducke, Arch. Jard. Bot. Rio 4: 118. 1925; Baehni, Candollea 7: 189. 1936; Le Cointe, Arvores e Plantas Uteis 457. 1934.

Scandent shrub, the rhizome an enormous starchy tuber; stems angular,

densely red-brown stellate-pubescent, lenticels minute and inconspicuous, the petioles 6–9 mm. long, stellate-pubescent; lamina rhomboid to ovate, 10–15 cm. long, 6–8 cm. broad, acuminate at apex, rounded at base, stellate-pubescent above and below especially on the veins and midrib; inflorescence axis sparingly stellate-pubescent or tomentose, bracts of the pedicels small, ovate, acute; calyx 4 mm. in diameter, the lobes triangular, acute, 1.3 mm. long, strigose-pubescent; petals ovate to oblong, 4.1–4.3 mm. long, 1.6–1.9 mm. broad, strigose without, villose within with a glabrous base, the center area protruding in a prominent fleshy ridge or flap, the apex inflexed; stamens one-half to two-thirds the length of the petals, the anthers 0.6 mm. long and 0.4 mm. wide, the anther sacs 0.1–0.2 mm. in diameter, the filament glabrous, 2.5–2.6 mm. long; ovary globose, 1.2 mm. high and 0.8 mm. in diameter, hirsute, the style less than one-half the length of the ovary, recurved; fruit broadly ovoid to globose, 5 cm. long and 4 cm. wide, densely stellate-pubescent, the mesocarp to 3 mm. thick, woody when dry, the putamen woody, smooth, to 0.7 mm. thick, the seed albuminous, the cotyledons ovate, thin, frequently folded or contorted.

TYPE LOCALITY: Pará, Brazil.

DISTRIBUTION: Amazonian Brazil.

BRAZIL: P a r á : Montealegre, Seru de Aroxy, on rocky ground, flowering in Dec. and fruiting in April, *Ducke* 9969 (US); A m a z o n a s : Santa Izabel, Rio Negro, flowers yellow, *Ducke* 342 (A, NY, US); Manáos, above Cochoeirinha, *Ducke* 25288 (US).

NATIVE NAMES: Mandioca-assu (Le Cointe), Mandiocassu, maira (Ducke). The common name of false mandioc is probably derived from the starchy character of the rhizome.

Humirianthera ampla (Miers) Baehni, *Candollea* 7: 182. 1936.

Letetia ampla Miers, Ann. Mag. Nat. Hist. III. 4: 364. 1859; Valetton, Crit. Overz. Olac. 186. 1885.

Mappia ampla Engl. in Mart. Fl. Bras. 12(2): 51. 1872.

Humirianthera Duckei Huber, Bull. Soc. Bot. Genève II. 6: 184. 1914; Ducke, Arch. Jard. Bot. Rio 3: 206. 1922; op. cit. 4: 118. 1925; Le Cointe, Arvores e Plantas Uteis 457. 1934.

Rhizomatous shrub or bush, young branches somewhat angular, glabrous, lenticels oblong, conspicuous, much lighter in color than the stem; petioles 8–10 mm. long, glabrate; lamina broadly lanceolate to elliptical, 8–20 cm. by 3–10 cm., the apex obtuse to acuminate, the base nearly acute or rounded, the midrib and veins prominent below; inflorescence axillary or terminal, strigose; calyx patelliform, lobes 1.3–1.6 mm. long, lanceolate, densely hirsute without; petals ovate-lanceolate to ovate, 3.5–4.3 mm. long, 1.4–2 mm. broad, almost equal, strigose without, villose, tomentose or rarely crispose within, the inflexed apex glabrous; filaments 2–3 mm. long, the anther sacs globose, connective tapering to an extended apex 0.6–0.8 mm. long; ovary globose, 1 mm. in diameter at anthesis, hirsute; the style 0.7 mm. long, glabrous, slightly incurved; fruit unknown.

TYPE LOCALITY: Near San Carlos on the Rio Negro, Venezuela.

ILLUSTRATION: Valetton, Crit. Overz. Olac. pl. 5, fig. 31. 1886.

DISTRIBUTION: Amazonian Venezuela and Brazil.

VENEZUELA: A m a z o n a s : San Carlos on the Rio Negro, *Spruce* 3776 (FM, G, NY). BRAZIL: P a r á : Obidos, *Ducke* 20633 (US); Trombetas, Rio Cumina-

mirim, *Ducke 14843* (US); Faro, *Ducke 8638* (US); Amazonas: Itacoatira, *Ducke 12479* (US).

NATIVE NAMES: Maria, Apolo (*Ducke*). Mandioca ossu (*Le Cointe*).

The numerous collections of *Spruce 3776* show a large range of leaf size for this species. The average size seems to be 5–10 cm. long and 7–13 cm. wide, although a photograph of the type sheet shows one leaf with dimensions of 20 cm. by 10 cm., which agrees with the figures published by Engler. This Spruce collection is commonly reported from Brazil; however, it was made in adjacent Venezuela, as verified in Spruce's account of his trip as reported by Wallace.

***Humirianthera crispula* sp. nov.**

Frutex usque ad 1–2 m. altus, ramis gracilibus, ramulis novellis teretibus sparse fulvo-stellato-pilosis; laminis foliorum ellipticis, orbicularibus vel ovatis, 9–13 cm. longis, 6–8 cm. latis, membranaceis, subtus dense pilosis (pilis non raro fasciculatis), apice obtusis vel raro acutis, basi rotundatis usque subcordatis; costa supra strigosa subtus prominenter strigosa pilis paucis stellatis ornata, venis primariis 4–5 arcuatis subtus prominulis supra sparse piliferis; cymis axillaribus aut terminalibus, laxis, ramulis hirsutis pilis stellatis ornatis; floribus usque ad 5 mm. latis; calyce late campanulato 4 mm. diametro, lobis oblongis abrupte acuminatis 1.4–1.8 mm. longis, 0.8–1 mm. latis, dense strigosis; petalis sub anthesi lanceolatis, maturitate ovatis, 4 mm. longis, 1.1–1.4 mm. latis, extus dense strigosis intus imo ad basim crispe pilosis; staminibus 2.5–3.2 mm. longis; antheris ovatis vel oblongis apice divergentibus 0.5 mm. longis, connectivo triangulari apicem antherarum 0.4 mm. superante, haud incrassato, filamentis maturis ca. 2–2.6 mm. longis filiformibus, apice attenuatis inflexis; ovario ovoideo dense strigoso, stylo brevi ovarium subaequante glabro recurvato; fructu ignoto.

COLOMBIA: Boyacá: "Mercedes" on Cano Canababure, about 10 km. above the mouth, alt. 180 m., flowers yellow, inodorous, abundant on savannah at edge of forest, Feb. 20, 1939, *Haught 2619* (TYPE US, isotype G).

The inflorescence in this species appears to be developed terminally, and by subsequent growth of a lateral shoot it assumes an axillary position. The cyme is up to 8 cm. high and 15 cm. wide. The petioles of the leaves are only slightly canaliculate above and become noticeably corky in age. They are sparsely stellate-pubescent and between 7 and 10 mm. in length. This collection from Colombia represents the first of the genus from that country.

Humirianthera crispula is closest to *H. ampla*.

EXPLANATION OF PLATES

PLATE I

Mappia mexicana Robins. & Greenm. Pringle 5094.

Fig. 1. Habit, $\times \frac{1}{2}$; 2. Longitudinal section of the pistil, $\times 14$; 3. Fruit, $\times \frac{1}{2}$; 4. Longitudinal section of the fruit, $\times \frac{1}{2}$; 5. Longitudinal section of the seed, $\times \frac{1}{2}$; 6. Pistil, showing the glabrous ovary and disk, $\times 14$; 7. Side view of a petal, $\times 11$; 8. Adaxial surface of a petal, showing the reduced amount of pubescence, $\times 11$; 9. Habit sketch of a partly opened bud, showing the glabrous outer surface of the petals, the slightly pubescent calyx teeth, the glabrous ebracteate pedicels, and the floral articulation, $\times 9$; 10. Portion of a mature stamen showing the filament and connective after the anther sacs have fallen, $\times 16$; 11-13. Lateral, abaxial, adaxial views of the stamens showing the basal attachment of the filament and the connective, $\times 16$.

PLATE II

Mappia angustifolia Griseb. Wright 2638.

Fig. 1. Habit, $\times \frac{1}{2}$; 2. Adaxial surface of the petal, showing aggregation of pubescence in the lower portion, $\times 10$; 3. Pistil, showing the hirsute ovary but glabrous disk, $\times 17$.

Figs. 4-13. *Mappia racemosa* Jacq. var. *brachycarpa* Griseb. Jack 6979.

Fig. 4. Habit, $\times \frac{1}{2}$; 5. Pistil, showing the hirsute ovary with a disk ciliate on the margin, $\times 11$; 6. Side view of fruit showing the rounded base, $\times \frac{1}{2}$; 7. End view of fruit, $\times \frac{1}{2}$; 8. Longitudinal section of the seed, $\times \frac{1}{2}$; 9. Ovarian disk with the pistil removed, showing the pubescence on the margin and the inside, $\times 20$; 10. Pistil with ovarian disk removed, showing the glabrous base, $\times 11$; 11-13. Lateral, abaxial, and adaxial views of the stamens, $\times 9$.

PLATE III

Nothapodytes dimorpha Craib. Maire 237.

Fig. 1. Habit, $\times \frac{1}{2}$; 2. Pistil, showing the hirsute ovary and glabrous disk, $\times 10$; 3. Adaxial surface of a petal showing the inflexed apex, papillate hairs on the outer surface and the short clavate hairs inside, $\times 9$; 4. Bud, showing the lobed calyx, $\times 6$; 5-7. Adaxial, lateral, and abaxial views of the stamens, showing the dorsal attachment of the filaments to the connective, the arching of the filament behind the anther, and the reflexed basal lobes of the anther tissue connected to the filament, $\times 11$.

PLATE IV

Humirianthera crispula Howard. Haught 2619.

Fig. 1. Habit, $\times \frac{1}{2}$; 2. Open flower, showing the bracteate hirsute pedicel and the floral articulation below the calyx, $\times 8$; 3. Mature recurved petal with extended tip showing the even crispate pubescence on the inside; note the change of shape from Fig. 4, $\times 7$; 4. Petal taken from bud, $\times 7$; 5. Side view of a petal, $\times 7$; 6. Basal view of the expanded calyx, $\times 7.5$; 7. Stellate cluster of hairs showing the rugose surface of the erect center hair and the smooth-walled arching hairs surrounding it, $\times 50$; 8. Mature pistil showing the glabrous recurved style and hirsute ovary, $\times 18$; 9. Para-sagittal section of the ovary showing the two pendant anatropous ovules, $\times 18$; 10-12. Lateral, abaxial, and adaxial views of the stamens taken from a bud, $\times 13$; 13-15. Adaxial, abaxial, and lateral views of the stamens from an opened flower; note the broad connective with the anther sacs diverging from the top, $\times 11.5$.

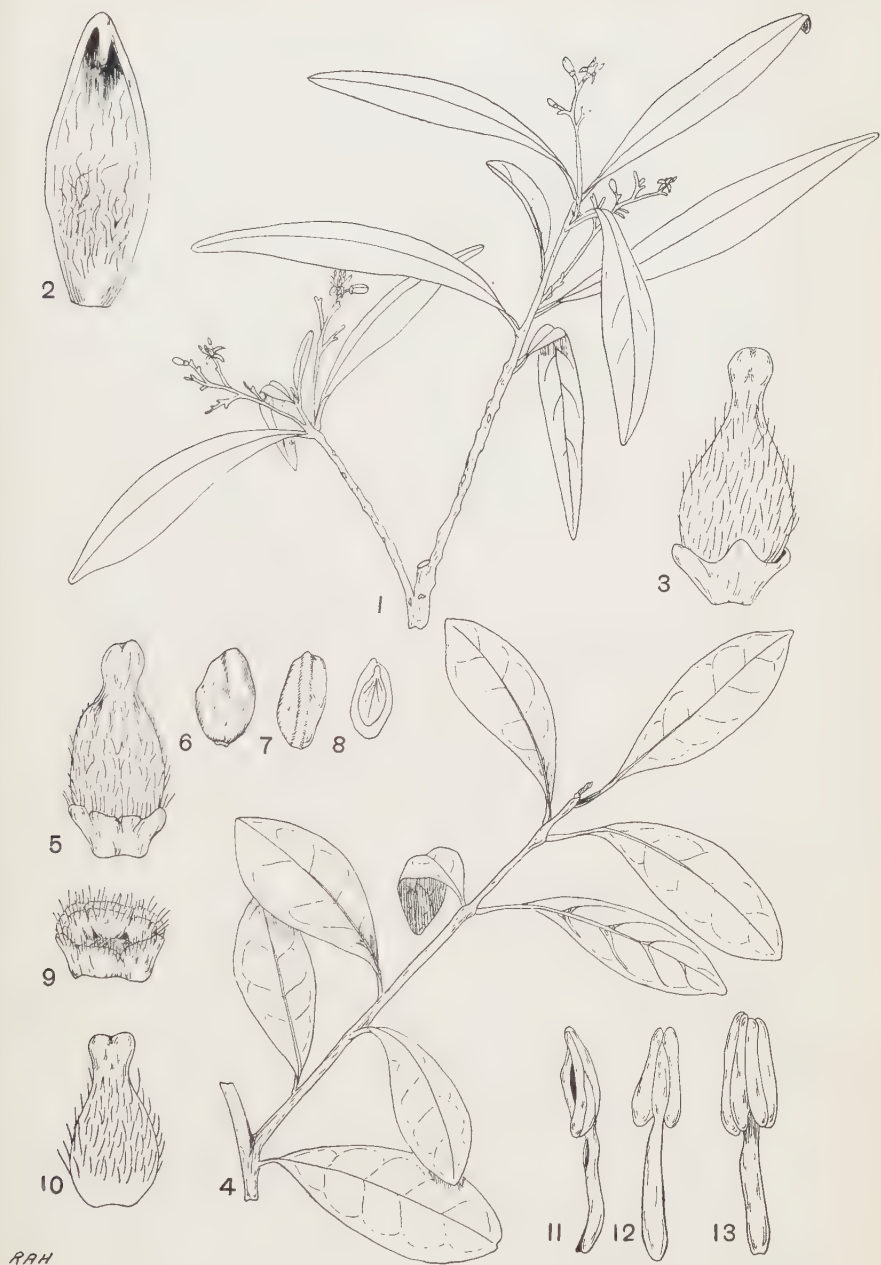
GRAY HERBARIUM,

HARVARD UNIVERSITY.



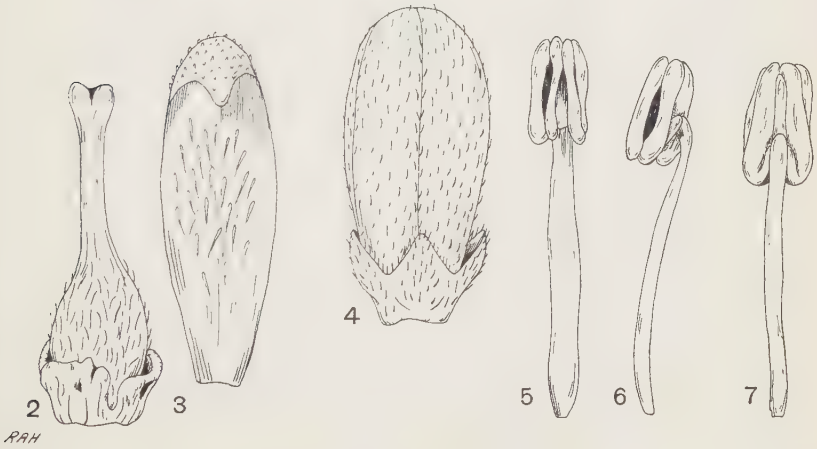
STUDIES OF THE ICACINACEAE, II





STUDIES OF THE ICACINACEAE, II





STUDIES OF THE ICACINACEAE, II





STUDIES OF THE ICACINACEAE, II



SOME PAPUAN MYRTACEAE*

C. T. WHITE

With one plate

1. CAPSULAR-FRUITED MYRTACEAE

(MYRTACEAE-LEPTOSPERMOIDEAE)

Metrosideros* Banks**Metrosideros ornata* sp. nov.***Metrosideros* sp. No. 264, Lane-Poole, For. Res. Terr. Papua and N. Guin. 128. 1925.

Arbor ad 16 m. alta, trunco ca. 33 cm. diam., cortice lepidoto flavo-fulvo ("yellow-brown" — fide Lane-Poole), ramulis velutino-pubescentibus, juvenilibus quadrangularibus. Folia obovato-lanceolata, apice breviter et obtuse acuminata, basi in petiolum gradatim angustata, supra glabra, subtus velutino-fulvo-tomentosa, margine leviter recurva, costa media supra leviter impressa, subtus valde elevata, nervis lateralibus crebris, parallelis sed utrinque plus vel minus obscuris; lamina 2.5–3.5 cm. longa, 0.6–1 cm. lata; petiolus ca. 2 mm. longus. Cymae terminales, ramulis angularibus dense pubescentibus. Flores rubri pedicellati, pedicellis 2.5 mm. longis. Calyx campanulatus, 6 mm. diam., lobis 5 rotundatis 2.5 mm. diam. Petala rotundata, 3.5 mm. diam., margine ciliolata. Stamina ca. 10, 1.2 cm. longa. Ovarium glabrum, 4-loculare, a calyce liberum.

BRITISH NEW GUINEA: Trail from Kokoda to the Gap, alt. 1600 m., *Lane-Poole* 264 (fl.), Aug. (small tree, 3 ft. girth, 50 ft. high; bark yellow-brown, scaly, the wood yellow, deepening to dark yellow or light brown; flowers scarlet).

Lane-Poole (l.c.) states, "The most ornamental tree I have seen in Papua. The dark green myrtle foliage and the scarlet flowers make a contrast which is most beautiful. The scarlet crowns can be picked out across wide valleys in these mountains."

***Metrosideros parallelinervis* sp. nov.**

Arbor ad 23 m. alta, trunco 52 cm. diam., cortice lepidoto, ligno rubro (fide Brass), ramulis junioribus dense sericeo-pubescentibus demum glabris. Folia ovato-lanceolata, juniora utrinque sericea demum glabra, apice longe et gradatim acuminata, basi subcuneata, supra subnitida, subtus pallidiora et opaca, nervis lateralibus supra obscuris, subtus prominulis subparallelis, crebris, vena marginali subtus prominula; lamina 3.5–5 cm. longa, 1–1.5 cm. lata; petiolus 2–3 mm. longus. Cymae axillares, 7–9-florae, 1.2 cm. diam., ramulis calycibusque dense albo-hirsutis. Calyx late campanulatus, 2.5 mm. diam., profunde 5-lobatus, lobis late triangularibus 1 mm.

*(Botanical Results of the Richard Archbold Expeditions) In addition to the plants collected on these expeditions, I have here described two others based on material in the Queensland Herbarium. Types of all species here described are deposited in the Queensland Herbarium and duplicates are in the Herbarium of the Arnold Arboretum.

altis. Petala flava, late et breviter ligulata, 2 mm. longa, margine ciliolata. Stamina ca. 15, filamentis leviter applanatis, 4 mm. longis, antheris parvis glandula magna ornatis. Ovarium a calyce liberum, hirsutum, triloculare.

NETHERLANDS NEW GUINEA: 4 km. sw. of Bernhard Camp, Idenburg River, alt. 950 m., frequent tree of mossy forest, on slope of ridge, *Brass 13149* (fl. and very young capsules), Mar. 1939 (tree 23 m. high, 52 cm. diam.; bark brown, scaly; wood red; fls. yellow; fruit yellow-green); same locality, alt. 900 m., very abundant as a subsidiary tree in *Agathis* forest, *Brass 13291* (TYPE: flowers) Mar. 1939 (tree up to 20 m. high, 30 cm. diam.; fls. yellow).

Among previously described species, the present one has the closest affinities with *M. Pullei* Diels, which differs in having shorter broader leaves, subterminal many-flowered cymes, and larger flowers.

***Metrosideros parviflora* sp. nov.**

Arbor ad 35 m. alta, partibus novellis dense sericeo-pubescentibus, ramulis subrobustis. Folia petiolata juvenilia manifeste discoloria, subtus albicantia, dense et minute punctata; adulta in sicco supra subnitida, subtus pallidiora et opaca, lanceolata, apice obtuse acuminata, basi cuneata, costa media supra impressa, subtus elevata, nervis lateralibus supra obscuris, subtus opacis; lamina 6–7 cm. longa, 1.5–2 cm. lata; petiolus 5 mm. longus. Flores parvi, flavi. Cymae terminales vel subterminales densiflorae, ramulis sericeo-hirsutis. Calyx late campanulatus, tenuiter sericeus, 4 mm. diam., lobis ovato-triangularibus, 1 mm. altis. Petala late ovata, 3 mm. longa, basi 2 mm. lata. Stamina ca. 20, petala vix aequantia, filamentis leviter applanatis, antheris parvis, apice glandula magna ornatis. Ovarium triloculare a calyce liberum, dense pilosum, apice subplanum. Capsula oblonga, 3 mm. longa.

NETHERLANDS NEW GUINEA: 6 km. sw. of Bernhard Camp, Idenburg River, alt. 1300 m., rare on slopes in primary rain-forest, *Brass & Versteegh 12570* (TYPE: flowers), Feb. 1939 (tree 35 m.; flowers yellow); 2 km. sw. of Bernhard Camp, Idenburg River, alt. 750 m., occasional tree on ridges in primary forest, *Brass & Versteegh 13516* (capsules), Mar. 1939 (tree 23 m. high).

Among previously described species, the present one is most closely allied to *M. Pullei* Diels, which differs in having smaller relatively broader subovate leaves, narrower (linguiform) petals, and shortly exserted stamens.

***Metrosideros Pullei* Diels in Bot. Jahrb. 57: 417. 1922.**

NETHERLANDS NEW GUINEA: Bele River, 18 km. ne. of Lake Habbema, alt. 2250 m., frequent in seral forest, *Brass & Versteegh 11104* (fls. and unopened capsules), Nov. 1938 (tree 19 m. high, 41 cm. diam., with small crown; bark 3 mm. thick, scaly; outer wood white, inner dark red; flowers yellow; fruit green); Balim River, alt. 2160 m., forested slopes, *Brass & Versteegh 11184* (fl.), Dec. 1938 (tree 21 m.; fls. yellow); 18 km. sw. of Bernhard Camp, Idenburg River, alt. 2050 m., frequent tree of primary forest, on ridge, *Brass & Versteegh 12503* (fls. and capsules), Feb. 1939 (26 m. high, 41 cm. diam.; bark brown, scaly; fls. yellow; fruit brown).

I have not seen authentic material of *M. Pullei* Diels, and the determination is made from the description only. The present specimens have slightly larger leaves than the type (the only specimens quoted by Diels, l.c.) but otherwise seem to agree.

***Metrosideros Pullei* Diels var. *parvifolia* var. nov.**

Folia ovata, apice acuta, basi subcuneata; lamina 1–1.5 cm. longa,

0.5–0.7 cm. lata; petiolus 1 mm. longus. Calyx 2.5 mm. diam. Petala 2.5 mm. longa.

NETHERLANDS NEW GUINEA: 18 km. sw. of Bernhard Camp, Idenburg River, alt. 2200 m., common on ridges in primary forest, *Brass & Versteegh 11999* (TYPE: flowers), Feb. 1939 (tree 21 m.; fls. yellow); 15 km. sw. of Bernhard Camp, Idenburg River, alt. 1800 m., very common subsidiary tree in mossy forest, *Brass 12007* (tree up to 20 m. high and 30 cm. diam.).

Mearnsia Merrill

Mearnsia cordata White & Francis, Proc. Roy. Soc. Queens. **39**: 67. *pl. 5, fig. 1*. 1928.

NETHERLANDS NEW GUINEA: Southern slopes of Balim Valley, alt. 2000 m., abundant in scrubs of *Vaccinium* and *Rhododendron*, on poor sandy soil, *Brass 11603* (capsules), Dec. 1938 (tree 3–4 m. high); Balim River, alt. 2000 m., in *Vaccinium* scrub on poor sandy soil, *Brass 11757* (fl. buds), Dec. 1938 (tree or shrub 3–4 m. high, fl. buds red); Bernhard Camp, Idenburg River, alt. 2150 m., in mossy forest, plentiful in the low scrub of an exposed summit and as a subsidiary tree in the forest, *Brass 12720* (old capsules), Feb. 1939 (3–8 m. high); 6 km. sw. of Bernhard Camp, Idenburg River, alt. 1200 m., *Brass 12916* (old capsules), Feb. 1939 (common epiphytic tree up to 15 m. high).

Mearnsia ovata sp. nov.

Metrosideros Regeli F. M. Bailey, Proc. Roy. Soc. Queens. **18**: 2. 1940, non F. Muell.

Frutex scandens, glaber, ramulis robustis juvenilibus quadrangularibus. Folia opposita, late ovata, subcoriacea, 2–2.5 cm. longa, 1.3–1.5 cm. lata, margine leviter revoluta, apice obtusa, basi sed cordata, supra subnitida, subtus opaca et distincte pallidiora et in sicco rubescentia, venis lateralibus ca. 12 in utroque latere in venam marginalem 0.25 mm. remotam conjunctis, supra prominulis, subtus visibilibus sed vix prominulis; petiolus 1 mm. longus. Flores fasciculati ex axillis foliorum delapsorum e ligno vetere. Pedicelli 2 mm. longi, tenues, glabrescentes. Calycis tubus turbinatus glabrescens, 2 mm. longus, lobis triangularibus vix 1 mm. longis. Petala rubra, orbicularia, 2 mm. diam., basi in unguem angustata, stamina uniseriata, rubra, 1 cm. longa. Ovarium immersum, triloculare; stylus 1.3 cm. longus.

BRITISH NEW GUINEA: Mt. Yale District, alt. 600 m., *F. R. Barton* (creeper growing up high forest tree, with very brilliant blossom).

Mearnsia scandens sp. nov.

Frutex scandens, partibus novellis pilis sericeis dense obsitis mox glabris, ramulis validis. Folia opposita, lanceolata vel angustissime obovata, subcoriacea, margine leviter revoluta, apice obtusa vel subobtusa, basi in petiolum validum angustata, supra subnitida, subtus opaca et leviter pallidiora, venis lateralibus ca. 14 in utroque latere in venam marginalem 0.25 mm. remotam conjunctis, supra obscuris, subtus prominulis; lamina 2.5–3.5 cm. longa, 0.8–1.2 cm. lata; petiolus 2 mm. longus. Flores fasciculati ex axillis foliorum delapsorum e ligno vetere. Pedicelli pilis albis sparsis obsiti, 3 mm. longi. Calycis tubus late turbinatus, 2 mm. longus, 4 mm. diam., subangularis, in parte inferiore pilis albis sparsissime obsitis, lobis late triangularibus. Petala rubra, orbicularia, 3 mm. diam., basi in unguem angustata. Stamina uniseriata, rubra, 1.7 cm. longa. Ovarium immersum, loculis 3; stylus ruber 2 cm. longus.

BRITISH NEW GUINEA: Palmer River, 2 miles below junction of Black River, alt. 100 m., common in ridge forests, *Brass 7062* (fls.), June 1936 (very showy canopy climber; stem free, covered with brown fibrous bark; branches climbing by adventitious

roots; leafy and flowering branches stiff, shrubby; calyx green; other parts of flower bright red).

Xanthostemon F. Muell.

Xanthostemon crenulatus sp. nov.

Arbor 10–18 m. alta, cortice fibroso-suberoso-lepidoto; ramulis validis, pubescentibus. Folia subopposita, oblonga, basi obtusa vel subobtusata, coriacea, margine undulato-crenulata, nervis lateralibus ca. 12, in sicco cum costa utrinque subprominentibus, venis reticulatis utrinque prominulis, lamina utrinque glabra, 7–11 cm. longa, 5–7.5 cm. lata; petiolus tomentosus, 5–6 mm. longus. Inflorescentiae terminales, densiflorae, ramulis dense tomentosis. Flores albo-virides, longe pedicellati, pedicellis tomentosis, 5–7 mm. longis vel (*Brass* 8473) ad 1.4 cm. longis. Calyx dense velutino-tomentosus, late campanulatus, 5 mm. diam., lobis 5 distantibus, 1.5 mm. altis. Petala 5, ovata, 2 mm. longa, dense tomentosa, basin versus in unguem plus vel minus constricta. Stamina numerosa, 7–9 mm. longa, filamentis glabris. Pistillum glabrum, stylo vix 1 cm. longo. Capsula basi lata adnata, caeterum libera, subglobosa, 3–4-locularis, 7–8 mm. diam., semina compresso-navicularia 5–6 mm. longa.

BRITISH NEW GUINEA: Wuoi, Oriomo River, alt. 10–30 m., common savannah tree, *Brass* 5805 (capsules), Jan. 1934 (dense foliaged, rather heavy boled tree, 10–12 m. high, with contorted branches; bark grey, thick, soft, and corky; wood hard, reddish; leaves pale); Gaima, Lower Fly River (east bank), savannah forest, plentiful on sandy soil, *Brass* 8358 (TYPE: flowers), Nov. 1936 (tree 16–18 m. high; bark soft, fibrous-suberose, scaly; leaf-margins wrinkled; fls. greenish); Penzara, between Morehead and Wassi Kussa Rivers, abundant on savannah forest ridges, *Brass* 8473 (fl.), Dec. 1936 (tree 10–12 m.; bark soft, fibrous, scaly; fls. greenish-white); Upper Wassi Kussa River (left branch), savannah forests, common tree, *Brass* 8602 (fls.), Jan. 1937.

The species now proposed is very closely allied to *X. oppositifolius* F. M. Bailey, which has a very limited distribution in southeastern Queensland. It is probably the species referred to by Lauterbach as *X. spec. aff. oppositifolius* Bailey, in Nova Guinea 8: 854. 1910, from Merauke River, Netherlands New Guinea.

The two species can be distinguished as follows:—

Leaf-blades 5–9 cm. long, 3–6 cm. broad; margins not distinctly undulate-crenulate; inflorescence few-flowered; calyx 1 cm. diam. at the top (in flower); capsule 1.2 cm. diam.	<i>X. oppositifolius</i> .
Leaf-blades 7–11 cm. long, 5–7.5 cm. broad; margins distinctly undulate-crenulate; inflorescence many-flowered; calyx 5 mm. diam. at the top (in flower); capsule 7–8 mm. diam.	<i>X. crenulatus</i> .

Xanthostemon papuanus Lauterb. in Nova Guinea 8: 854. 1910.

NETHERLANDS NEW GUINEA: Hollandia and vicinity, alt. 20–100 m., abundant on dry deforested slopes covered with grass and fern, old seral rain-forest, *Brass* 8801 (fls. and young fr.), June–July 1938 (small tree 15–17 m.; fls. red).

I had drawn up a description of these specimens as a new species, but now consider them to be conspecific with Lauterbach's plant, of which, unfortunately, I have not seen an authentic specimen. The present ones differ from the description in the leaves being scattered, not crowded towards the ends of the branches, the venation I should say obscure rather than slightly prominent, and the stamens being red, not yellow. This last, however, is a

very variable feature in some myrtaceous genera, especially in the allied ones, *Melaleuca* and *Callistemon*.

Xanthostemon paradoxus F. Muell. in Hook. Kew Jour. **9**: 18. 1857; Fragm. Phytogr. Austr. **1**: 80. 1859

BRITISH NEW GUINEA: Dagwa, Oriomo River, common savannah forest tree, *Brass* 5932 (old capsules), Feb.-Mar. 1934 (rather crooked tree, 12-15 m., with thick leafy crown of stiff branches, thick scaly bark, and hard reddish wood; leaves somewhat glaucous); Mabaduan, common in savannah forests, *Brass* 6556 (old capsules), April 1936 (stiffly branched tree 12-14 m. high; bark dark brown; leaves clustered at ends of branchlets); Lake Daviumbu, Middle Fly River, plentiful in rain-forest outskirts in contact with savannahs, *Brass* 7503 (fls. and fr.), August 1936 (tree 30 m.; bark dark grey, hard, fissured, early deciduous; flowers yellow, appearing a few days before the leaves fall); same locality and date, *Brass* 7869 (fl. and young lvs.), Sept. 1936; Tarara, Wassi Kussa River, abundant on savannah forest ridges and entering rain-forests, *Brass* 8575 (old capsules), Dec. 1936 (tree up to 30 m. high with dark fissured bark).

This species was originally collected by Mueller himself in Arnhem's Land. Mr. F. J. Rae kindly forwarded the type gathering on loan. This consists of two sheets, both very scrappy and not quite identical. Apparently the original description was drawn up from both. The species is as yet very imperfectly known in Australia, but I should consider all the above Papuan specimens to come under it (*sens. lat.*).

***Tristania* R. Br.**

***Tristania ferruginea* sp. nov.**

Arbor 30 m. alta vel ultra, cortice tenui fibroso, ligno fusco duro (fide Brass), partibus junioribus densissime ferrugineis, vetustioribus glabris. Folia coriacea, obovata, apice obtusa vel emarginata, basi in petiolum longum angustata, supra nitida, subtus pallidiora et opaca, in juventute dense floccoso-ferruginea, costa media supra impressa, subtus valde elevata, nervis lateralibus supra subobscuris in venam marginalem ca. 1 mm. remotam conjunctis; lamina 5-6.5 cm. longa; petiolus 2-2.5 cm. longus. Inflorescentiae multiflorae in axillis foliorum superiorum, in cymam terminalem ca. 8 cm. diam. dispositae, ramulis densissime ferrugineo-pubescentibus. Calyx late campanulatus, 3 mm. diam., extus in parte inferiore dense in parte superiore tenuiter ferrugineo-tomentosus, 5-lobatus, lobis late triangularibus, minute ciliolatis. Petala 5, calycis lobos paulo superantia, subrotunda. Stamina in phalanges 5 petalis oppositas 3-4-andras disposita, filamentis pilosis, petala paulo superantibus. Ovarium pilosum. Capsula subglobosa, trilocularis, 4 mm. diam., parte adnata 2 mm., libera 1.5 mm. longa.

BRITISH NEW GUINEA: Fly River, 528-mile Camp, alt. 80 m., characteristic canopy tree of ridge forest, *Brass* 6852 (detached capsules), May 1936 (tree 30 m.; foliage dense in crown, young leaves reddish; trunk deeply fluted toward the base, dark brown, fibrous; wood dark brown, hard and tough); Palmer River, 2 miles below junction of Black River, alt. 100 m., dominant tree of ridge forests, *Brass* 7168 (TYPE: flowers) (over 30 m.; branches semi-erect, forming a thick rounded crown; tree spurred at the base; older trees deeply fluted; bark thin, fibrous; wood hard, brown, very durable; petals white).

In its markedly obovate leaves and small flowers with short few-androus phalanges, the present species is closely allied to *T. obovata* Benn., which

is, however, perfectly glabrous in all its parts, has narrower more shortly petiolate leaves, and fewer-flowered lateral and axillary inflorescences.

Tristania longivalvis F. Muell. in Wing, South Sc. Record, n.s. 2: April 1886.

BRITISH NEW GUINEA: Western Division, Wuroi, Oriomo River, common savannah tree, sometimes within light rain-forest, *Brass* 5754 (fls.), Jan.-Mar. 1934 (clear-boled slender tree of upright branching habit, with brown flaky fibrous bark and hard wood; fls. bright yellow); Mabaduan, savannah forests, not common, *Brass* 6544 (fls.), Apr. 1936 (tree 10-15 m., with thin gray laminated fibrous bark; fls. bright buttercup-yellow); Tarara, Wassi Kussa River, abundant, forming bushy forests on clay ridges along river, *Brass* 8530 (fls.), Dec. 1936 (tree 12-15 m., fls. yellow).

These specimens have more lanceolate narrower leaves than all the Australian ones I have seen, but otherwise seem inseparable.

Tristania suaveolens Smith in Rees, Cyclop. 36: no. 2. 1817.

BRITISH NEW GUINEA: Western Division, Wuroi, Oriomo River, *Brass* 5900. (fr.), Jan.-Mar. 1934; Dagwa, Oriomo River, common savannah forest tree, *Brass* 5972 (fr.), Feb.-Mar. 1934 (leaves greyish underneath, the midrib and nerves yellowish above); Daru Island, common on drier soils in savannah forests, *Brass* 6327 (fls.), Mar. 1936 (tree about 15 m. tall, usually leaning and misshapen; bark brown, fibrous, flaky; fls. white); Lake Daviumbu, Middle Fly River, forming pure fringe forests 20-25 m. high, extending to less arid savannahs, *Brass* 7792 (fls.), Sept. 1936 (bark laminated, fibrous, reddish brown; fls. white); Tarara, Wassi Kussa River, ridges of savannah forests, *Brass* 8401 (fls.), Dec. 1936 (25 m. or more; bark brown, fibrous, laminated and fissured; fls. white); Tarara, Wassi Kussa River, savannah forest, one of the principal trees on the ridges, *Brass* 8537 bis (fls.), Dec. 1936 (attaining 30 m.).

Basisperma gen. nov.

(Tribus Leptospermeae: Subtribus Metrosidereae)

Flores hermaphroditi. Calycis tubus late campanulatus vel explanatus, limbo prominente 5-dentato. Petala 5, patentia. Stamina numerosa, pluriseriata, petalis breviora, in phalanges 5 petalis oppositas plus vel minus connata, filamentis filiformibus, antheris minutis versatilibus, loculis parallelis longitudinaliter dehiscentibus. Ovarium superum, biloculare. Stylus filiformis, stigmatate minute capitato; ovula in loculis numerosa, in placenta basilari erecta. Capsula subglobosa, latere saepe compressa; valvae coriaceae vel sublignosae, intus semisepto medio notatae; semina perfecta, pauca, magna, testa subcarnosa; semina abortiva numerosa oblonga parva. Arbor. Folia alterna, opposita vel ternatim verticillata, lanceolata, pennivenia. Flores in cymas axillares pedunculatas bracteolatas dispositi.

Species 1 in Papua crescens.

Basisperma lanceolata sp. nov.

PLATE I.

Arbor 7-8 m. (fide Brass), partibus novellis sericeis, ramulis junioribus quadrangulatis. Folia alterna, opposita vel ternatim verticillata, lanceolata, apice acuta, basi cuneata in petiolum gradatim angustata, supra glabra, subtus argentea, sericeo-tomentosa; nervi praecipui ca. 30 in utroque latere, in sicco utrinque prominuli, in venam intramarginalem 0.5 mm. remotam conjuncti; petiolus 5-7 mm. longus, lamina 8-9 cm. longa, 2-2.5 cm. lata. Cymae axillares, ca. 1.5 cm. diam., bracteolis pedunculis ramulis pedicellis-que sericeis; bracteolae paucae lanceolatae 1-2 mm. longae, pedunculi 1-1.5 cm. longi; pedicelli 2-3 mm. longi. Calyx sericeus, late campanulatus, sub

fructu explanatus, ca. 6 mm. diam., limbo prominente 5-dentato, dentibus triangularibus 1 mm. altis. Petala 5, oblonga (?). Stamina in phalanges 5 petalis oppositas ca. 12-andras disposita, filamentis petalis brevioribus. Capsula aurantiaca (fide Brass) subglobosa, ca. 7 mm. diam., valvae coriaceae vel sublignosae, intus nitidae, semi-septo medio notatae; semina perfecta pauca (1-3), rubra, testa subcarnosa in sicco rugulosa; semina imperfecta oblonga, 1 mm. longa.

BRITISH NEW GUINEA: Western Division, Tarara, Wassi Kussa River, common in rain-forest along river, *Brass* 8377 (fruit), Dec. 1936 (tree 7-8 m.; fruit orange-yellow; seeds red).

The generic name refers to the basal position of ovules and seeds. The closest affinities of *Basisperma* are, I think, with *Tristania* R. Br., which differs in having the ovary trilocular and adnate to the calyx, even though it may be only at the base, the ovules being pendent or horizontal, not basal and erect, and the seeds being dry, small, and frequently winged at one end.

The single specimen originally sent to me was in fruit only, and a careful search failed to reveal any flower fragments that might assist in identification. The wholly superior bilocular *Pittosporum*-like capsule, with basal placentation, made me doubt whether it was actually myrtaceous. A specimen sheet, which by good fortune contained the remains of a flower, was sent to Prof. Irving W. Bailey for examination, and he concluded that the plant agreed with Myrtaceae in the following respects: leaf venation; absence of stipules; a unilacunar node; large oil glands in pith cortex, leaf, flower, and fruit; structure of the internal phloem; presence of simple thick-walled unicellular hairs; possession of concentric rings of hard bast; structure of vessels, tracheids, parenchyma and rays; abundance of tannin; and structure of the pollen. The only disagreement with Myrtaceae was the superior ovary. In his report on the plant, Prof. Bailey wrote: "I was able to examine the pollen and flower due to the keen eyes of my assistant Heintzelman, who spotted a dried-up petal that was attached to one of the fruits by the hyphae of a fungus. Attached to the base of this deciduous petal were about 12 stamens. Each stamen has a large oil gland at the apex of the anther. The structure of the flower appears to have been as shown in the somewhat diagrammatic sketches on the accompanying plate."

Later, Dr. Perry searched through the duplicate material of this number collected by Brass and sent me a flower fragment similar to that seen by Prof. Bailey. The above description has been drawn up from this material. It is hoped that additional flowering specimens may be available later, to enable a more complete account of the new genus to be made.

Eucalyptus L'Her.

(Determinations by W. F. Blakely, Botanic Gardens, Sydney)

Eucalyptus clavigera A. Cunn. ex Schauer in Walp. Rep. 2: 926. 1843.

BRITISH NEW GUINEA: Western Division, Tarara, Wassi Kussa River, savannah forests, localized on well drained soils, not very common, *Brass* 8568 (fls. and old capsules), Dec. 1936 (conspicuous tree up to 25 m. high, 0.6 m. girth; lower stem

grey-black, scaly; bark of upper stem smooth, yellowish grey; branchlets weak, often pendent).

Eucalyptus papuana F. Muell. Descript. Notes Pap. Pl. 1: 8. 1875.

BRITISH NEW GUINEA: Western Division, Daru Island, savannahs in centre of the island, rare, *Brass* 6054 (fr.), Mar. 1934 (tree up to 10 m.; base of trunk rough; upper trunk and branches smooth, greenish grey).

A form with very constricted fruits.

Eucalyptus tereticornis Sm. Bot. New Holl. 41. 1793.

BRITISH NEW GUINEA: Western Division, Dagwa, Oriomo River, alt. 40 m., savannah forest ridges, rare, *Brass* 5947 (fls.), Feb.-Mar. 1934 (open-crowned tree attaining 15 m.; branchlets somewhat pendent; bark of trunk pale ash-grey, furrowed and fissured, 1-1.2 cm. thick on tree 22 cm. diam.; bark of branches grey or blue-grey, smooth, exfoliating in long folded strips; fls. white; capsules about 1 cm. diam. across the rim); savannah forest, a number of trees in an isolated patch, uncommon, *Brass* 6004 (fls.), Feb.-Mar. 1934 (tree of open erect branching habit, about 15 m. high; branchlets weak; lower half of trunk covered with rough grey furrowed bark; bark of upper trunk and branches smooth, blue-grey, peeling in long folded strips; leaves pale; fls. white; operculum waxy creamy white; pedicels angled), *Brass* 6005 (same with very young fr.); Wuroi, Oriomo River, alt. 10-50 m., savannah forests, uncommon, *Brass* 6020 (fls. and fr.), Jan.-Mar. 1934 (tall unshapely tree, attaining 25 m. or more; lower trunk bark persistent, dark grey, rough, shallowly fissured; upper trunk and branches smooth, blue-grey); Daru Island, plentiful in savannah forests, *Brass* 6428 (fr.), Apr. 1936 (tree about 25 m.; trunk on lower part with fibrous rough-grey bark, exfoliating in long irregular pieces about 3 mm. thick; bark of branches smooth, bluish grey); Tarara, Wassi Kussa River, subsidiary to *E. terminalis* on savannah forest ridges, *Brass* 8402 (fr.), Dec. 1936 (slender tree, 15 m.; bark on stem fissured, scaly, on branches smooth, grey; young leaves glaucous beneath; fls. not seen); savannah forest, fairly common ridges, *Brass* 8719 (fls. and fruits), Jan. 1937 (tree about 20 m.; bark dark, rough, hard, fissured; bark on branches smooth, grey; fls. white).

Mr. Blakely, in his "Key to the Eucalypts," 130 (1934), adopts the combination *E. umbellata* (Gaertn.) Domin for this species. Prof. Osborn (Proc. Linn. Soc. N.S.W. 62: 76. 1937), however, has pointed out that the combination is untenable due to the earlier publication of *E. umbellata* Dum.-Cours. The Papuan specimens have a more robust appearance than the common Australian form, and Mr. Blakely remarks that they represent "the tropical and probably a very old form of the species."

Eucalyptus terminalis F. Muell. in Jour. Linn. Soc. 3: 89. 1859.

BRITISH NEW GUINEA: Western Division, Dagwa, Oriomo River, rare in savannah forest, *Brass* 5970 (fl. buds and old capsules picked up under trees), Feb.-Mar. 1934 (large thick-trunked tree attaining 25 m. with trunk diam. of 60 cm.; branches wide-spreading and sparsely foliated; bark averaging about 1.8 cm. on a trunk 60 cm. diam., pale brown, soft, shortly fibrous, scaly; wood hard and heavy; sapwood pale; inner wood reddish; leaves greyish beneath; veins more conspicuous above; fl. buds and pedicels scabrid, silver-grey); Daru Island, common savannah tree, *Brass* 6048 (fls.), Mar. 1934 (large, thick-trunked tree with grey-brown, soft, fibrous and somewhat scaly bark; petioles and young branches red; leaves greyish beneath; profusion of large white flowers); Mabaduan, abundant in canopy layer of savannah forest, *Brass* 6557 (fls.), Apr. 1936 (tree 15-18 m.; stem straight, cylindric; heavy spreading branches, forming flattish crown; bark pale brown, fibrous, soft and brittle; wood hard, heavy, reddish brown; fls. white), a rather coarse-budded form; Tarara, Wassi Kussa River, savannah forests, locally abundant on well drained soil, *Brass* 8746 (very young buds and old fr.), Jan. 1937 (tree up to 25 m., 0.6-0.7 m. diam.; bark thick, soft, fissured, fibrous, brown).

Agonis DC.

Agonis lysicephala (F. Muell. & F. M. Bailey) F. M. Bailey, Synopsis Queens. Fl. Suppl. 2: 37. 1891; Francis and White, Proc. Roy. Soc. Queens. 37: 158. 1926.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, plentiful on lower savannah ridges, *Brass* 7797 (fl. and capsules), Sept. (very slender tree 1.5–3 m.; coppice shoots produced from a thickened stock when aërial parts are killed by fires; fls. white); Lower Fly River, savannah areas, common about edges of swamp, *Brass* 8357 bis (fl. and capsules), Nov. (shrub 1 m. high; fls. white); Tarara, Wassi Kussa River, abundant on grey flats of savannah forest, *Brass* 8382 (fls. and capsules), Dec. (shrub less than 1 m. high); same locality, *Brass* 8709 (forming dense scrubs 2–3 m. high, fls. white).

Melaleuca L.

Melaleuca Cunninghamii Schauer in Walp. Rep. 2: 927. 1843.

Melaleuca Leucadendron L. var. *sanguinea* Cheel in Ewart and Davies, Fl. North. Terr. 296. 1917.

Melaleuca Leucadendron L. var. *Cunninghamii* Cheel, l.c. 297.

BRITISH NEW GUINEA: Wuroi, Oriomo River, very abundant in grey soil ridges, *Brass* 5695 (fls.), Jan.-Mar. 1934 (contorted, sparsely foliaged low tree, with thin, somewhat fibrous papery bark; petioles red; fls. red); dominant species in low and often rather scrubby savannah on grey soil ridges, *Brass* 5714 (fls.), Jan.-Mar. (low, loosely branched, sparsely foliaged tree 4–6 m., with somewhat fibrous, laminated grey bark; fls. red); Daru Island, low swampy land about middle of island, common, *Brass* 6036 (fls.), Mar. (rather crooked small tree, 8–10 m., with grey papery bark; petioles red; flowers numerous, greenish white); Lake Daviumbu, Middle Fly River, savannahs, forming low scrubs on acid soils, *Brass* 7794 (fls.), Sept. (tree 3–6 m.; bark laminated, papery; fls. red); Western Division, Mabaduan, abundant in savannah forests as sub-stage tree, *Brass* 6558 (fls.), Apr. (tree 6–8 m. high; branches stiff, contorted; bark grey in paper-like layers; wood reddish, dark, heavy; occasional on savannah ridges, *Brass* 7937 (fls.), Sept. (low tree 3–4 m.; fls. greenish white); sour savannah slopes, *Brass* 7938 (fls.), Sept. (about 1 m. high, branched or unbranched; fls. pink); common on sour savannah slopes, *Brass* 7939 (fls.), Sept. (variable dwarf form, branched or unbranched, about 1 m. high; fls. various shades of red); Penzara, between Morehead and Wassi Kussa Rivers, poorly drained flats of savannah forest, *Brass* 8478 (fls.), Dec. (tree 5–7 m.; fls. red); Tarara, Wassi Kussa River, plentiful in low scrubs, dominated by *Agonis*, *Brass* 8710 (fls.), Jan. (sparsely branched stiff tree 1.5–2.5 m.; fls. pink to red).

Melaleuca Cunninghamii Schauer is a common tree in North Australia and southern Papua. It occurs in two main colour forms, one with flowers a deep blood red, the other with flowers a greenish-white, with an occasional intermediate form with pink flowers (*Brass* 7938 and 8710) or various shades of red (*Brass* 7939).

Colour is an extremely variable feature in both *Melaleuca* and *Callistemon*. Cheel, in a valuable study of the North Australian species of *Melaleuca* (in Appendix II of the Flora of the Northern Territory by Ewart and Davies), proposes to treat both forms as separate varieties of *M. Leucadendron* L.

Melaleuca Cunninghamii Schauer var. **glabra** var. nov.

Varietas rhachi et calycibus glabris.

BRITISH NEW GUINEA: Western Division, Tarara, common in poorly drained savannah forests, *Brass* 8485 (TYPE; flowers), Dec. 1936 (crooked slender tree 5–8 m.; bark grey, papery; fls. greenish white).

AUSTRALIA: The following sheets in Herb. Kew represent this variety: Port Essing-

ton, *Gilbert* (presented by John Gould Esq.); Carpentaria, *R. Brown* 4712; N. W. Australia, *A. Cunningham* (voyage of the *Beagle*, 1839, marked in Cunningham's handwriting, "calyx not silky as in *M. Cunninghamii*"); N. W. coast, *Bynoe*; North coast, *A. Cunningham*; E. C. Australia, *A. Cunningham*; Wednesday Island, Torres Straits, *Moseley, Challenger Exped.* 9174. It is represented in Herb. Brisbane by the following: Stannary Hills, *T. L. Bancroft*; Frewhurst, Etheridge Railway, *C. T. White* 1369 (fls.), Feb. 1922; near Chillagoe, forming open communities in damper places on grey, sandy soil, *S. T. Blake* 13565 (fls.), Apr. 1938 (slender erect or somewhat weeping tree, 15–20 ft., with compact whitish, scarcely papery bark; leaves rather yellowish green; flowers pale greenish).

Melaleuca Leucadendron L. Mant. 105. 1767.

BRITISH NEW GUINEA: Western Division, Daru Island, common in low savannah in centre of island, *Brass* 6041 (fls.), March 1934 (tree 20–25 m., with straight stout trunk and whitish papery bark; peduncles and calyces glabrous; petals and stamens white; style green).

Melaleuca Leucadendron L. vel aff. BRITISH NEW GUINEA: Lower Fly River, east bank opp. Sturt Island, forming pure swamp forests, 30–35 m. high, *Brass* 8147 (fr.), Oct. 1934 (leaves slightly glaucous; petioles red).

Melaleuca Leucadendron L., aff. BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, forming narrow fringe forests on swampy shores of lagoons, *Brass* 7956 (fr.), Sept. (tree 20 m.; petioles red).

A very distinctive plant, probably representing an undescribed species. The leaves are broadly elliptic and prominently 9-nerved, and the fruits are remarkably small. I hesitate to name it until flowers are available.

Melaleuca Leucadendron L. aff. BRITISH NEW GUINEA: Western Division, Wurci, Oriomo River, common in tall savannahs and close to rain-forest, *Brass* 5814 (fls.), Jan.–Mar. (tree about 30 m., with clear, rather slender trunk; fls. greenish white); Daru Island, extensive pure stand in shallow margins of big open swamp, *Brass* 6372 (fls.), Mar. (tree 10–12 m. tall; fls. white); Mabaduan, forming pure swamp forests, 30–35 m. high, *Brass* 8147 (fr.), Oct. (leaves slightly glaucous; petioles red).

All the above probably represent a distinct species, probably undescribed. I do not care, however, to name them until a complete revision of the *M. Leucadendron* L. series has been made, which is not possible until types in European herbaria are available for study.

Melaleuca Leucadendron L. var. *minor* Cheel in Ewart and Davies, Fl. North Terr. 299. 1917.

BRITISH NEW GUINEA: Tarara, Wassi Kussa River, subsidiary tree on savannah forest ridges, *Brass* 8407 (fl.), Dec. (6–10 m.; bark grey, laminated in papery layers; foliage grey; flowers green).

These specimens agree with what is regarded in Australia as *M. Leucadendron* L. var. *minor* Cheel, though whether this is the same as *M. minor* Sm., the type of which comes from Amboina, it is impossible to say until an examination of Smith's specimen is possible. When working at the Royal Botanic Gardens, Kew, in September 1939, I noticed a great mixture of Asiatic material under *M. minor* Sm., and this probably applies to most European herbaria.

Melaleuca sp. aff. **M. Leucadendron** L. (cf. C. T. White in Proc. Roy. Soc. Queens. 34: 46. 1922; Jour. Arnold Arb. 10: 253. 1929).

BRITISH NEW GUINEA: Gaima, Lower Fly River, the principal tree of savannah forests, *Brass* 8247 (fl.), Nov. (30 m. or more, with spreading open crown; bark grey-brown, laminated, fibrous-papery; foliage grey; fls. white; end of style green).

These specimens differ from those previously referred to by me (l.c.) in the leaves being clothed with fine silky hairs. In this respect, it is very like *M. argentea* W. V. Fitzg. of North Australia. The more glabrous specimens previously collected by Brass are almost inseparable from much material at Herb. Kew and elsewhere placed under *M. minor* Sm. The filaments are much shorter than in most other groups of the *M. Leucadendron* L. series. Unfortunately, many types are unavailable for study at present, and until the types can be studied, critical work on this difficult group is impossible.

Melaleuca symphyocarpa F. Muell. in Trans. Phil. Inst. Vic. **3**: 44. 1858.

BRITISH NEW GUINEA: Wuroi, Oriomo River, abundant on savannah ridges and in light rain-forest, *Brass 5690* (fls.), Jan.-Mar. (straight-trunked tree, with rounded crown of upright branches attaining 25 m.; bole rather slender; bark thick, deeply furrowed, fibrous, brown; wood hard, heavy, brown, free-splitting; sapwood and inner bark surfaces finely ridged or striate; fls. bright red; most trees in full flower); Gaima, Lower Fly River (east bank), abundant in dense savannah forests, *Brass 8295* (fls.), Nov. (erect tree 20-25 m.; bark brown, fibrous, deeply fissured; wood brown, hard, durable; fls. red); Tarara, Wassi Kussa River, savannah forest, confined to ridges, *Brass 8533* (fls.), Dec. (tree 10-20 m.; stem cylindrical; bark grey-brown, thick, fibrous, with thick short fissures; flowers red).

Like many other melaleucas, especially those of the "*Leucadendron*" group, this species occurs in two distinct colour forms. The yellow-flowered form may be distinguished as follows:

Melaleuca symphyocarpa f. *aurantiaca* f. nov.

Flores aurantiaci.

BRITISH NEW GUINEA: Tarara, Wassi Kussa River, in poorly drained savannah forests, *Brass 8381* (fls.), Dec. (tree 7-10 m.; branches drooping; stem fluted; bark hard, fissured; sapwood finely corrugated; fls. orange-yellow); Tarara, Wassi Kussa River, dominant over much flat savannah forest, *Brass 8532* (fls.), Dec. (tree 7-10 m.; branches drooping; stem fluted; bark grey, fissured, fibrous, very hard; flowers orange-yellow).

Melaleuca viridiflora Sol. ex Gaertn. Fruct. **1**: 173. tab. 15. 1788, vel aff.

BRITISH NEW GUINEA: Tumbuke, Wassi Kussa River, *Brass 8480* (fr.), Dec. (compact, bushy tree; bark grey, papery, laminated; no fls. seen).

These specimens are in fruit only, but agree with much *M. viridiflora* Sol. material from eastern Australia, and as understood by Cheel in Ewart and Davies, Flora of the Northern Territory, p. 299.

Baeckea L.

Baeckea frutescens L. Sp. Pl. 358. 1753.

NETHERLANDS NEW GUINEA: Balim River, alt. 2000 m., abundant on poor sandy soil, *Brass 11838* (capsules), Dec. (slender shrub up to 1 m. high).

2. FLESHY-FRUITED MYRTACEAE (MYRTACEAE-MYRTOIDEAE)

Fenzlia Endl.

Fenzlia obtusa Endl. Atakta 19, t. 17. 1833.

BRITISH NEW GUINEA: Lower Wassi Kussa River, with *Dodonaea* sp. in xeric shrubberies on clay bank of river, *Brass 8411* (leaf specimen only), Dec. 1936 (shapely shrub 1-1.5 m.); same locality, abundant on clay banks of river, *Brass 8728* (fls. and fr.), Jan. 1937 (shrub 1-3 m.; fls. pink, later white; fr. orange-yellow).

Rhodamnia Jack

Rhodamnia cinerea Jack in Malay. Miscel. 27. 1822, sens. lat.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, rain-forest canopy tree, *Brass* 7784 (fls.), Sept. 1936 (25 m. high; trunk spurred at base; bark soft, brown, fibrous, scaly; flowers white, rose-scented); same locality, dry type rain-forests, plentiful in substage and extending to *Tristania* fringe forests, *Brass* 7791 (fls.), Sept. 1936 (bark dark grey, soft, fibrous, deeply fissured; flowers white); Gaima, Lower Fly River (east bank), common in light rain-forest and extending to savannahs, *Brass* 8289 (fls.), Nov. 1936 (bushy tree 10–12 m. high; bark rough, fissured; flowers white); Tarara, Wassi Kussa River, sporadic in savannah forests, *Brass* 8703 (fr.), Jan. 1937 (tree 7–8 m.; bark dark, fissured).

The Malayan and Papuan species of *Rhodamnia* are badly in need of revision, work that must wait for more propitious times, when types in European herbaria are again available for study.

Rhodamnia spongiosa Domin in Bibl. Bot. **89**: 1030. 1928; C. T. White in *Blumea* Suppl. **1**: 218. pl. 14, fig. 7. 1937.

BRITISH NEW GUINEA: Lower Fly River, east bank, opp. Sturt Island, rain-forest of dry inland ridges, *Brass* 8179 (fls.), Oct. 1936 (virgate tree; fls. white, delicately fragrant); Tarara, Wassi Kussa River, rain-forest substage or small canopy tree, *Brass* 8593 (fls.), Dec. 1936 (tree attaining 15 m.; bark grey-brown, hard, fibrous, shallowly fissured; flowers white).

Myrtella F. Muell.

Myrtella Beccarii F. Muell. Descript. Notes Pap. Pl. **1**: 106. 1877.

NETHERLANDS NEW GUINEA: Hollandia and vicinity, alt. 20–100 m., plentiful on open slopes covered with *Gleichenia* and *Ischaemum*, *Brass* 8887 (fls. and fr.), June–July 1938 (flat topped shrub 1.5 m. high; fls. white; fruit soft, black).

Mr. F. J. Rae kindly compared for me a piece of the above with the type sheet at the National Herbarium, Melbourne, and states they agree very well.

Rhodomyrtus DC.

Rhodomyrtus macrocarpa Benth. Fl. Austr. **3**: 273. 1866.

BRITISH NEW GUINEA: Western Division, Dagwa, Oriomo River, alt. 40 m., in creek bank, gallery forest, rare, *Brass* 5989 (fl. buds), Feb.–Mar. 1934 (tree 8–10 m., of compact growth; leaf-nerves deeply impressed above; flowers buds white).

Rhodomyrtus novoguineensis Diels in Bot. Jahrb. **57**: 378. 1922.

BRITISH NEW GUINEA: Central Division, Mt. Tafa, alt. 2400 m., amongst dense scrambling bamboo in a forest clearing, rare, *Brass* 5110 (fls. and young fr.), May–Sept. 1933 (slender branched bush 2 m.; leaves pale green; fls. cream coloured). NETHERLANDS NEW GUINEA: 15 km. sw. of Bernhard Camp, Idenburg River, alt. 1800 m., occasional in mossy forest, *Brass* 12053 (fr.), Jan. 1939 (slender shrub 3 m. high); Bernhard Camp, Idenburg River, alt. 2150 m., several plants on an open rock slide, *Brass* 12455 (fr.), Feb. 1939 (very slender tree; fruit soft, yellow).

I have not seen an authentic specimen of *R. novoguineensis* Diels and the above determinations are from his description. *Brass* 5110 is very like *R. trineura* F. Muell., but the other two plants are of different appearance. It is possible that two species are represented.

Rhodomyrtus pinnatinervis sp. nov.

Frutex vel arbor parva, partibus junioribus foliis subtus pedicellis bracteolis calycibusque plus vel minus dense griseo-pubescentibus. Folia petiolata,

lanceolata, supra mox glabra, costa media supra impressa, subtus elevata, nervis lateralibus utrinque 10-12, supra leviter impressis, subtus valde elevatis; lamina 4-8 cm. longa, 1.5-2 cm. lata; petiolus 5-8 mm. longus. Flores axillares, solitarii, longe pedicellati; pedicelli 2-2.5 cm. longi; ad apicem bibracteolati; bracteolis anguste ovatis, 3-4 mm. longis. Calyx (in fructu) profunde 5-lobatus, lobis suborbicularibus 3 mm. diam. Petala alba (fide Brass), 6 mm. longa, basi unguiculata, in sicco pustulata (sed in specimine meo imperfecta). Bacca flava, 10-11 mm. diam. (fide Brass), extus dense griseo-tomentosa, in sicco ca. 8 mm. diam., multi-locularis.

BRITISH NEW GUINEA: Central Division, Mt. Tafa, alt. 2350 m., edge of clearing in mossy forest, *Brass 4085* (fls.), May-Sept. 1933 (bush 2-2.5 m., with upright branches; lvs. red when about to fall; flowers white); Mt. Tafa, alt. 2400 m., in a small shrubbery on rest clearing in ridge forest, *Brass 4895* (fr.), May-Sept. 1933 (bush about 1.5 m. high; old leaves red; fruit soft, yellow, 10-11 mm. diam.); same locality and habitat, common, *Brass 4905* (TYPE: old flowers and immature fruits), May-Sept. 1933 (small tree or bush; leaves dark; young foliage grey; pedicels, calyx and fruit grey-pubescent; corolla white; fruit immature).

Among previously described species, the present one seems to agree most closely with *R. psidioides* Benth., common in southeastern Queensland, which differs in having larger, more glabrous leaves, and the flowers in cymes, not solitary in the axils.

Rhodomyrtus trineura F. Muell. ex Benth. Fl. Austr. 3: 272. 1866

BRITISH NEW GUINEA: Tarara, Wassi Kussa River, rain-forest, common in substage, *Brass 8555* (fl.), Dec. 1936 (fls. white); same locality, substage or lesser canopy tree in rain-forest, *Brass 8592* (fls.), Dec. 1936 (attaining 14-15 m.; bark brown, soft, fibrous, fissured, exuding a reddish gum when cut; fls. white).

These specimens represent a form with particularly long pedicels, up to 1.5 cm. long, and bibracteolate at the apex. They represent the var. *pedicellosa* F. Muell. ex White and Francis (Bot. Bull. Brisbane 22: 26. 1920).

Rhodomyrtus calophlebia sp. nov.

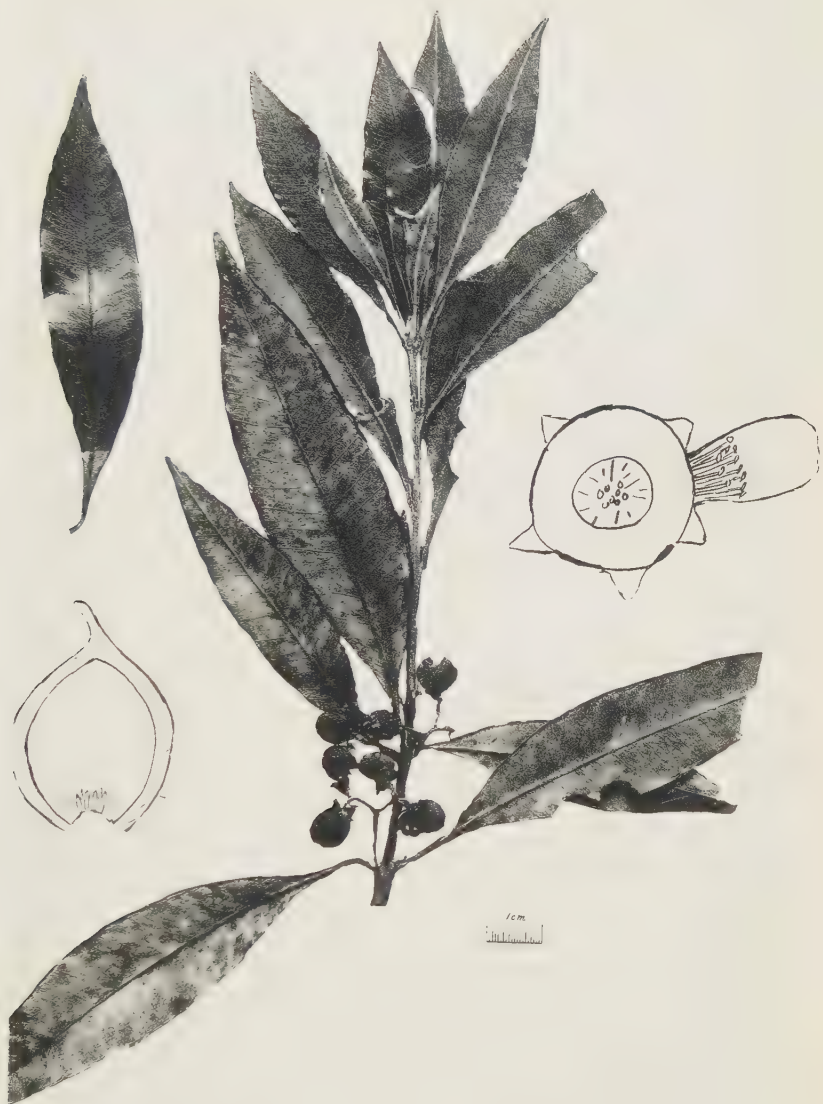
Arbor humilis patula 4 m. alta, ramulis crassiusculis innovationibus angulatis dense fusco-pubescentibus. Folia opposita vel alterna elliptica petiolata, lamina 13-18 cm. longa, 5-9 cm. lata, utrinque gradatim angustata vel apice subabrupte acuminata, acumine 5-8 mm. longo, utrinque costa nervisque primariis parce conspersequ pubescentibus exceptis glabra, manifeste reticulata minute pustulata, costa subtus elevata, nervis primariis prominulis utrinsecus 12-15 oblique patentibus in venam intramarginalem prominulam 0.8-1 cm. a margine confluentibus, juxta marginem cum venula minore parallelam, petiolo 2.5 cm. longo. Flores non visi. Bacca ut videtur axillaris solitaria subsessilis, pedunculo 2-3 mm. longo, ovoidea, basi bibracteata (bracteis linearibus 4 mm. longis 1 mm. latis obtusis), breviter stipitata 3.5 cm. longa 2 cm. diametro extus dense fusco velutina, seminibus numerosis in acie dupla superpositis.

BRITISH NEW GUINEA: Central Division, Rona, Laloki River, alt. 450 m., on bank of a small stream in rain-forest, only one tree seen, *Brass 3600* (fruit), April 1933 (low spreading tree, 4 m.; leaves dull; fruit pale brown, solitary in axils of the leaves).

The above plant, I think, is referable to *Rhodomyrtus* and is very similar to *R. macrocarpa* Benth. The leaves are opposite and alternate, which is

rather unusual in the Myrtoideae, and their venation is striking, though of a type common in the family. The fruits have the same structure as those of *R. macrocarpa* Benth.

BOTANIC GARDENS,
BRISBANE, AUSTRALIA.



BASISPERMA LANCEOLATA C. T. WHITE



NEW BAMBOOS, AND SOME NEW RECORDS, FROM
FRENCH INDO-CHINA¹F. A. McCLURE²

Six species are described as new; one earlier description emended. Four of the new species are from a lot of 17 numbers of bamboos (comprising 12 species in six genera) included in a general collection made under the joint auspices of Lingnan University and the Arnold Arboretum by W. T. Tsang between May and October, 1940. The bamboos in this collection were all gathered in the vicinity of Sai Wong Mo Shan, Hoi Ning Province, east-central Tonkin.

The types of the new species from Tsang's collections are to be deposited in the herbarium of the Arnold Arboretum, and duplicates in the herbarium of Lingnan University.

***Indosasa angustata* sp. nov.**

Species omnium generis mihi cognitarum proxima *I. gibbosae* (McClure) McClure,³ sed culmorum vaginis versus apicem angustissimum attenuato-angustatis, marginibus sursum rectis vel concavis (haud convexis), dorso inter nervos aciculis a latere patentibus subpersistentibus obsitis, culmorum ramorumque nodis minus inflatis procul recedens.

Culmi fere 8 m. alti et 4.2 cm. diametro (teste Tsang), erecti, omnino glabri; *internodia* anguste fistulosa, levis vix nervosa, primo tenuiter cerata deinde porriginosa, postremo munda; *nodis* cicatrice prominuli, supra cicatricem in supercilium latum modice inflati. *Culmorum vaginae* valde elevato-nervosae, crassiusculae chartaceaeque mox dissolutae, sursum longe attenuato-angustatae, marginibus sursum rectae vel concaviusculae (haud convexae), apice angustissimae, dorso inter nervos aciculis a latere patulis, hyalinis, brunneatis, subpersistentibus, obsitae, marginibus ciliis brunneatis fimbriatae; *auriculae* fere haud evolutae; *setae orales* utrinque vulgo 2-4, 3-4 mm. longae, rigidae, scabrae vel hispidae, basi crassae, sursum attenuatae; *ligula* usque ad 5 mm. alta (vagina quinta) et ultra, dorso dense hispida, apice convexa, margine integro ciliata; *lamina* erecta, rigidula, subpersistens, anguste triangula, in apicem angustum subulate acutum attenuata, marginibus involuta, utrinque glabra vel supra, basin versus, hispida. *Rami* vulgo 2, interdum 3 vel 1, semipatentes, valde inaequales vel subaequales, tenues, rigidi, usque ad 35 cm. longi (in specimine), omnino glabri; *ramuli* solitarii vel raro gemini, vaginellis basalibus gemmiparis, aphyllis, persistentibus, elevato-nervosis, plerisque primo plus minusve dense hispidulis vel substrigosis, sensim glabrescentibus. *Foliorum vaginae*

¹Contribution from the Botanical Survey, Lingnan University.

²Professor and Curator of Economic Botany, Lingnan University, Canton, China. On leave, 1941-.

³*Indosasa gibbosa* (McClure) comb. nov.

Sinobambusa gibbosa McClure, Lingnan Univ. Sci. Bull. 9: 58. 1940.

4–10, infimis laxae, superioribus arcte amplexantibus, elevato-nervosae, dorso primo setis patulis deciduis et basi bulbosis, sparse obsitae, demum papillosoe; *auriculae* nullae vel debiles, glabrae; *setae orales* nullae vel paucae, tenues subtiliter scabrae; *ligula* circa 1 mm. longa, basi crassa, dorso hispidula, apice convexiuscula, margine integro glabra; *petiolus* 5–10 mm. longus, utrinsecus glaber; *foliorum laminae* usque ad 21.5 cm. longae et usque ad 3.4 cm. latae, lanceolatae vel oblongo-lanceolatae vel sublinearilanceolatae, pleracque apice basique attenuatae, interdum infima basi rotundata, apice scabro-subulatae, supra glabrae, subtus dense hispidulae, utrinque subconcoloratae, marginibus cartilaginae; *venulae transversae* utrinque conspicuae. *Inflorescentiae* desideratae.

TYPE: *W. T. Tsang 30050*, collected June 18, 1940, near Lung Waan. "Wild; occasional on dry clay soil in forest; culms 20 Chi. ft. (7.5 m.) tall." Chinese name (Cantonese): *Foo Chuk*, i.e., Bitter Bamboo.

It is with some hesitation that I place this species here. It is not closely allied to any of the known species of *Indosasa*, and it shows some affinity toward some of Gamble's narrow-sheathed species of *Arundinaria*, but the latter are not all true *Arundinarias*, and their generic affiliation remains to be determined.

***Indosasa solearis* sp. nov.**

Species proxima *I. crassiflorae* McClure, sed pseudospiculis multo angustioribus, lemmatibus textura tenuioribus et nervis prominentioribus, palea apice resecta ita soleaeforme sat distincta.

Culmi 2–3 m. alti (teste Petelot), glabri (pars superior tantum 73 cm. longa adest); *internodia* fistulosa (in specimine retorrida et profunde striata); *nodi* cicatrice et supra cicatricem in supercilium angustum sulcatum valde prominentes. *Culmorum vaginae* desideratae. *Rami* (floriferi tantum adsunt) solitarii vel basi semel iterumve divisi, semipatentes, glabri; *nodi* basi vaginellis deciduis instructi. *Foliorum vaginae* laminaeque desideratae. *Inflorescentiae* pseudospiculae ad nodos ramorum aphyllorum quasi spicate dispositae. *Pseudospiculae* usque ad 8 cm. longae, subfusiformes, deorsum longe angustatae, apice hebetere acutae, primo solitariae, nonnullis demum basi divisae ita binis vel etiam ternis venientibus. *Rhachis* pseudospicularum 10–15 mm. longa, glabra, internodiis 1–2 mm. longis, nodis haud inflatis, omnibus gemmiferis. *Prophyllum* membranaceum, circa 5 mm. longum, carinis longe ciliatum, alioquin glabrum. *Bractee gemmiparae* circa 9, persistentes, tenuiter chartaceae, nervosae, glabrae, I: 3–4 mm. longa, ovata, obtusa, subapiculata, dorso carinata, sequentibus gradatim nervosioribus longioribusque (quarum V^a vel VI^a longissima est) usque ad 14–16 mm. longis, apice sublaminiferis (infra apicem constrictis), superioribus circa 3 gradatim brevioribus, suprema 9–12 mm. longa, apice apiculata. *Spiculae* 5–13-florae. *Flosculae* omnes perfectae, infimis 1–2 interdum supremis 1–3 semper tabescentibus. *Gluma vacua* 1–0, formae lemmateos sed brevior. *Rhachillae segmenta* crassa, intus medullosa, in sicco cava, curvata, latere concavo sulculo mediano notata, omnino nitida, latere convexo versus apicem ciliolatum scabra, alioquin glabra. *Lemma* amplum, subventricosum, circa 12 mm. longum, obtusum vel subacutum, apiculatum, extus glabrum et nervis valde prominentibus nervosissimum, nervis sursum obscure tessellatis, intus apicem versus scabrum et nervis conspicue tessellatis notatum, marginibus glabrum. *Palea* lemmate multo brevior angustiorque, tenuiter char-

tacea, debiliter carinata, apice obtuso subcomoso revecta ita solcaeformis, secus carinas prope tantum apicem sparse ciliolata, extus alioquin glabra vel secus margines interdum scabriuscula. *Lodiculae* amplae, nervosissimae, subaequales, lanceolatae vel oblongo-lanceolatae, apice subite acuminata vel subacuta, utrinque glabrae, marginibus ciliatae, duobus anterioribus dimidio infimo uno latere valde incrassatis brunneatisque, alioquin omnino hyalinae. *Antherae* circa 5 mm. longae, lineares, apice emarginatae. *Ovarium* angustum, glabrum, apice attenuatum. *Stylus* brevis, glaber. *Stigmata* 3 approximata, subnuda, interdum quasi ala hyalina instructa. *Fructus* maturus non inventus.

TYPE in U. S. National Herbarium, no. 1610012, collected in December 1930, by *Petelot* (no. 4287), "bamboo 2-3 m. high, forming thickets (*broussailles*) at an altitude of about 1000 m. on the Vam Dao massif, Tonkin."

The specific name (Latin, sandal-shaped) alludes to the peculiar shape of the palea, which results from the folding forward of the apex to form a shallow pocket like the toe of a lounging slipper. This feature distinguishes the species at once from all the others known to me.

Bambusa aurinuda McClure, Lingnan Univ. Sci. Bull. no. 9: 3. 1940.

When this species was set up, *W. T. Tsang* 29447, consisting of sterile material but including good culm sheaths, by which the plant may be identified without difficulty in the field, was chosen as the type. *W. T. Tsang* 28988, with leaves and flowers but no culm sheaths, was taken, on the basis of a careful comparison of the few vegetative characters available, to be the same. On the strength of this conclusion, *W. T. Tsang* 28988 was used as the basis of a description of the flowers, and was designated as a hypotype of the species. The present collection under *W. T. Tsang* 30198, however, contains both flowers and good culm sheaths, presumably from the same plant, and the flowers prove to be different from those of *W. T. Tsang* 28988 originally taken to be the same species and designated as a hypotype. In the light of this new material, it seems best to exclude *W. T. Tsang* 28988 from the concept of the species, and to prepare a new description on the basis of the more complete material, including flowers reasonably presumed to be associated with the sheaths, which are like those in the type. It will be seen that the vegetative structures, including the culm sheaths, in the new material agree in all particulars with the type, and with the original description of the type.

Culmi erecti vel suberecti, usque et ultra 11 m. alti (teste Tsang), omnino glabri; *internodia* teretia, fistulosa, inania; *nodi* cicatrice crasso elevati, supra cicatricem vix vel paullo inflati. *Culmorum vaginae* deciduae, in sicco papyraceo-coriaceae vel coriaceae, omnino, praecipue margines versus, valde elevato-nervosae, dorso marginibusque glabrae; *auriculae* validae, inaequales, obovatae vel oblongae, in vaginis superioribus plerisque plus minusve excurrentibus reflexisque, utrinque obscure scabrae; *setae orales* in vaginis inferioribus saepissime nullae vel auricularum margine exteriori 1-2, in superioribus 1-plurimae, 5-10 mm. longae, sinuosae, pallido-vel fusco-stramineae, rigidae, basi glabrae vel obscure scabrae, in sicco fragilissimae fugacesque; *ligula* in medio 1-2 mm. alta, utrinque vix coarctata, apice convexa vel arcuata, margine integro dense pallido-striata; *lamina*

erecta utrinsecus nervosa, in vaginis inferioribus subtriangulis, in superioribus ovato-lanceolata, apice subito acuminata subulataque, basi subcordata, extus glabra, intus inter nervos aciculis fuscis antrorse scabra vel substrigosa, marginibus modice involutis, basin versus ciliatis. *Rami* inermes patentes; *ramuli* usque ad 11-foliati, alioquin ut in *B. tuldoidea* Munro. *Foliorum vaginae* dorso marginibusque glabrae; *auriculae* valde evolutae, olivaceae, falcatae, glabrae vel scabriusculae; *setae orales* pleraeque valide evolutae, tenuissimae, fragiles, pallidae, sinuosae, glabrae vel basi obscure hispidulae; *ligula* brevissima vix exserta; *petiolus* brevis crassus utrinque glaber vel supra hispidulus; *laminae* usque ad 20 cm. longae et usque ad 22 mm. latae, oblongo- vel lineari-lanceolatae, apice acutae vel longo-acuminatae, glabro-subulatae, infimis basi subcordatis, supremis basi attenuatis, supra glabrae vel secus marginem exteriorem scabrae, subtus sparse (interdum obscure) pilosulae, demum glabrescentes; *venulae transversae* non manifestae, "glandulis pellucidis" minutis tamen compluribus. *Inflorescentiae* pseudospiculae ad nodos ramorum ramulorumque nudorum in glomerulis dissitis congestae. *Pseudospiculae* usque 4.5–5 cm. longae lineares, vel teretes vel subteretes. *Rhachis* brevissima, glabra. *Bractae gemmiparae* vulgo 2, brevissimae, ovatae, obtusae, chartaceae, fragiles. *Spiculae* subcylindricae vel paullo compressae, 5–12-florae, mox discedentes. *Flosculae* omnes perfectae, superiores 2–3 semper, infima interdum, tabescentes. *Gluma vacua* vulgo 1, formae lemmateos sed brevior, vulgo 5–6 mm., raro 8.5 mm. longa, glabra. *Rhachillae segmenta* claviformia, glabra, pleraque $\frac{1}{4}$ – $\frac{1}{3}$ paleae aequantia. *Lemma* usque ad 10 mm. longum, naviculiforme, acutum, apiculatum, glabrum, chartaceum, plurinerve, secus nervos dilute violascente. *Palea lemma* aequans vel brevior, apice acuto comosula, carinis sursum tantum sparse subtiliterque ciliolata, alioquin glabra vel apicem versus inter carinas subtiliter hispidula. *Lodiculae* hyalinae, subaequales, ovato-lanceolatae, obtusae, marginibus ciliatae. *Antherae* 4–4.5 mm. longae, luteae. *Ovarium* generis, apice hispidulum. *Stylus* brevis, crassiusculus, hispidulus. *Stigmata* 3, plumosa. *Fructus* maturus non inventus.

This redescription of the species is based on *W. T. Tsang 30198*, collected July 22, 1940, near Lung Waan. "Semi-cult. for edible shoots; occasional near villages on dry clay soil; culms 30 Chi. ft. (11.24 m.) tall." Chinese name (Cantonese): *Taai Wong Chuk*, i.e., Large Yellow Bamboo.

On the basis of the culm sheaths in the type, this species was placed near *B. tuldoidea* Munro. The flowering material now available confirms this relationship, as does the larger stature indicated for the plant. The spikelets in our species, however, are more slender and the florets in each spikelet are significantly more numerous and smaller. Our species is most readily distinguished from *B. tuldoidea* on the basis of the auricles and other features of the culm sheath.

The case of the confusion of two species illustrated above serves to emphasize the importance of collectors' securing culm sheaths definitely and unmistakably associated on the same plant with flowers whenever possible, for the simple reason that without such association made in the field, taxonomic work based on flowering material alone can be of little use for field determinations, since the plants to be identified in the field usually do not afford flowers, but do present culm sheaths for at least a

part of each year. The culm sheaths are usually quite as distinctive as the flowers, and often much more strikingly so. This fact was recognized by Munro and other earlier botanists, to whom, however, very little material containing culm sheaths was available, and by Gamble, whose work on the bamboos of India is eminently useful for field determinations, chiefly because he paid special attention to the culm sheaths.

It is now necessary that the material under *W. T. Tsang 28988*, originally misidentified as *B. aurinuda* McClure, be given a new status.

***Bambusa Tsangii* sp. nov.**

Species primo cum *B. aurinuda* McClure, a me confusa, tamen inflorescentiae *B. aurinudae* verae nunc inventae, praeterea aperte distinctae esse probatae sunt. *Bambusa Tsangii* a *B. aurinuda* saltem pseudospiculis comparative lentius divisus, pseudospiculis flosculisque multo amplioribus, lemmatibus dimidio longioribus differe videtur.

Culmi erecti vel suberecti, circa 3 m. alti (teste *Tsang*); *internodia* teretia vel subteretia, glabra, anguste fistulosa; *nodi* glabri, cicatrice et supra cicatricem prominuli. *Culmorum vaginae* deciduae desideratae. *Rami* plures, inermes, glabrae, tenues (superiores tantum adsunt), inaequales, uno mediano ceteris multo longiore crassioreque. *Foliorum vaginae* glabrae; *auriculae* pleraeque validae, falcatae, glabrae, margine nudae vel processis tenuissimis glabris radiatis sparse instructae; *ligula* perbrevis, basi crassa, dorso hispidula, apice recta vel convexiuscula, margine integro plerumque glabra; *petiolus* perbrevis, utrinsecus glaber, supra saepe rugulosus; *laminae* usque ad 10.5 cm. longae et usque 1.4 cm. latae, lanceolatae vel oblongo-lanceolatae, apice acutae vel acuminatae et quasi aristatae, infimis basi cordato-superioribus cuneato-rotundatis, utrinsecus glabrae vel subtus interdum pilis mollibus sparse obsitae, marginibus cartilagineis inaequaliter spinulosae; *venulae transversae* non manifestae. *Inflorescentiae* pseudospiculae ad nodos ramorum ramulorumque vel nudorum vel basi foliiferorum, primo solitariae demum plus minusve aggregatae, ramis ramulisque sterilibus foliiferis interdum cum floriferis intermixtis. *Pseudospiculae* usque ad 5 cm. longae, fusiformes curvatae, mox dissolutae. *Rhachis* brevissima, glabra, tarde ramosa. *Bractee gemmiparae* vulgo 2, valde inaequales, superiore vulgo 5 mm. raro usque ad 9 mm. longa, glabrae, nervosae, apiculatae. *Spiculae* subteretes, paullo compressae, 7-8-florae. *Flosculae* omnes perfectae, superiores 1-2 semper, infima interdum, tabescentes. *Glumae vacuae* vulgo nullae. *Rhachillae segmenta* $\frac{1}{4}$ - $\frac{1}{3}$, rarissime paene $\frac{1}{2}$ paleae aequantia, claviforme vel cuneata, fistulosa, uno latere plana, prope apicem ciliolatum scabriuscula, alioquin glabra, infra lemmata tantum disarticulata. *Lemma* usque ad 15 mm. longum, tenuiter papyraceum, nervosum, glabrum, olivaceum, apice saepissime purpura dilute tincto, acutum, apiculatum. *Palea* lemmate brevior vel raro subaequalis, apice hebetate acuta comosulaque, inter carinas 7-nervis, glabra, carinis ciliata, extra carinas obscure scabriuscula. *Lodiculae* subaequales hyalinae, utrinque glabrae vel interdum dorso molliter hirtellae, marginibus ciliatae. *Antherae* maturae omnes descitae, reliquis junioribus tantum apice obtusis emarginatis vel quasi bicornibus. *Ovarium* generis, apice hispidum. *Stylum* 1-2 mm. longum hispidum. *Stigmata* 3, plumosa. *Fructus* maturus non inventus.

TYPE: *W. T. Tsang 28988*, collected May 7, 1939, near Chan Uk Village, Ha Coi, at the foot of Taai Wong Mo Shan, Tonkin. "Wild; fairly common among scattered

shrubs on sandy soil; 3 m. tall; flowers (anthers!) light yellow." Chinese name (Cantonese): *Wong Chuk*, i.e., Yellow Bamboo.

This species was at first confused with *B. aurinuda*, and was made the basis of a description of the flowers of that species, and for that reason was designated as a hypotype of that species. However, now that the flowers of *B. aurinuda* have been found associated with culm sheaths of that species, they prove to be unmistakably distinct. *Bambusa Tsangii* differs from *B. aurinuda*, so far as the material available is concerned, in the longer and more slowly branching pseudospikelets, the larger and fewer-flowered spikelets, and the lemmas longer by a half.

Bambusa Tsangii is apparently closely allied to *B. tuldoidea* Munro, from which, on the basis of the material available, it is weakly distinguished by its smaller stature, the less strongly congested inflorescences, the lemmas more prominently apiculate, the palea with keels much more prominently ciliate, and the subglabrous leaves. It is probable that the culm sheaths, when they are known, will reveal more conspicuous differences. The large, almost solitary pseudospikelets in *B. Tsangii* are reminiscent of those of *B. multiplex* (Lour.) Raeusch., but the much smaller individual florets, the prominently ciliate keels of the palea, and subglabrous leaves which are concolorous on the two surfaces readily distinguish it from Loureiro's species.

The species is named for W. T. Tsang (Tsang Wai-tak) whose energetic and discerning field work has brought to light many plants new to science.

Lingnania atra sp. nov.

Species characteribus nonnullis *L. Chungii* (McClure) McClure affinis sed saltem internodiis culmorum ligni crassi pulchre striatis, conformatione vestitue vaginorum culmorum, vaginis foliorum auriculas et setas orales carentibus, laminis foliorum subtus glabris aperte distincta.

Culmi erecti usque et ultra 11 m. alti (teste Tsang); *internodia* modice elongata, fistulosa, inania, cylindrica, praecipue infra nodos glauca, infimis supra nodos pilis sericeis adpressis crasse tectis, alioquin ab initio omnino glabra; *nodi* cicatrice glabro valde prominentes, supra cicatricem paullo inflati. *Culmorum vaginæ* deciduae, ut in generis typo crassae induratae et faciliter fissiles, apice vel convexae vel arcuatae vel subrectae laxaeque, dorso glaucae, *basi retrorse atro-hirsutae*, alioquin *aciculis atris* (vel in superioribus pallidioribus) antrorse adpressis et basi bulbosis plus minusve dense obsitis; *auriculæ* (in culmis saltem magnitudinis maturitatis) nullae vel fere ad lineam longissimam redactae, margine ciliolae deciduae instructae; *setae orales* sparsae, erectae, tenues, basi bulbosae hispidaeque, caducae mox fugaces; *ligula* vix 1 mm. alta, haud exserta, latitudine apicem latissimum vaginae aequans, margine processibus fragilissimis usque ad 15 mm. longis basi hispidulis sursum glabris tenuissimis fimbriata; *lamina* erecta plus minusve persistens demum abscidens, firma, vel plana vel marginibus plus minusve involuta, lanceolata, apice attenuato-acuminata, basi constricta, utrinque nervosa, dorso glabra, ventre scabra. *Rami* numerosissimi, congesti, tenuissimi, longitudine valde inaequales, ima basi et sursum divisi, internodiis elongatis, glabris, nodis paullo inflatis, vaginellis nervosis, deorsum aciculis patentibus, deciduis, basi bulbosis, sparse

obstitis, demum papillosis deciduisque. *Foliorum vaginac* tenues, tenuiter nervosae, glabrae vel infimis interdum ut in vaginellis ramorum pubescentiae, dorso carinatae; *auriculae* setae oralesque nullae vel debilissimae; *ligula* brevissima haud exserta; *petiolus* utrinque glaber; *laminae* usque ad 38 cm. longae et usque ad 2.4 cm. latae, oblongo- vel lineari-lanceolatae, apice attenuato-acuminatae, aristatae, basi cuneato-rotundatae, utrinque glabrae vel interdum subtus deorsum prope costam pilis sparse instructae; *venulae transversae* subtus interdum obscure manifestae. *Inflorescentiae* desideratae.

TYPE: *W. T. Tsang 30546*, collected Sept. 29, 1940, near Kau Kaai Ts'uen, at the foot of Kau Nga Shan. "Wild; occasional on wet soil in forest near stream; culms 30 Chi. ft. (11.24 m.) tall, used by the natives to make paper." Chinese name (Cantonese): *Shan Taan Chuk*, i.e., Mountain Single (-node) Bamboo. A sample of the paper made from this bamboo was secured by the collector and a part of it will be distributed with each duplicate.

The specific name alludes to the very black hairs clothing the lower culm sheaths.

***Lingnania sesquiflora* sp. nov.**

Species habitu scandente, spiculis pallidis parviflorisque affinis *L. scandenti* McClure, sed spiculis semper sesquifloribus, palea carinis breviter ciliatis, foliorum vaginis cum auriculis et setis oralibus saepissime valde evolutis, ligula margine longe fimbriata, laminis omnibus proportionem latioribus et basi rotundatis aperte distincta.

Culmi scandentes usque ad 6 m. alti (teste Tsang); *internodia* (superiora tantum adsunt) fistulosa, inania, cylindrica, glabra, pallida; *nodi* cicatrice collari prominente glabro 2-3 mm. lato instructi, supra cicatricem paullo inflati et interdum pro parte pilis sericeis adpressis tecti. *Culmorum vaginac* deciduae (desideratae). *Rami* plures, fasciculati, glabri, tenues, praecipue ima basi divisi, interdum supra semel vel raro iterum divisi, inaequales, uno mediano ceteris multo longiore crassioreque, floriferis et foliiferis vel distinctis et remotis vel intermixtis vel ramis simul flores simul folios gerentibus. *Foliorum vaginac* glabrae, interdum primo tenuiter ciliatae, postea porriginosa, nunc congestae nunc longe exsertae; *auriculae* nullae vel valde evolutae semirobundatae, fuscae, glabrae vel obscure scabrae, saepe reflexae; *setae orales* nullae vel (auriculis praesentibus) valde evolutae, basi bulbosae, in margine tantum auricularum arctae, usque ad 10 mm. longae, fuscae et obscure scabrae, supra tenuissimae, radiatae; *ligula* circa 1.5 mm. longa, dorso glabra, apice vulgo convexa, margine ciliis deciduis vel fugacibus utrinque 2-3 mm. longis, medio brevioribus fimbriata; *petiolus* crassus, basi bulbosus quasi pulvinatus, et saepissime rugosus, utrinque glaber vel supra interdum hispidulus; *laminae* usque ad 25 cm. longae et 5.4 cm. latae, oblongo-oblancheolatae vel paene oblancheolatae vel (basalibus brevibus) lanceolatae, apice attenuato acuminatae subulataeque, basi rotundatae, subtus secus unum latus tantum costae sparse pilosae, alioquin utrinsecus glabrae; *venulae transversae* non manifestae vel interdum obscurissimae inventae. *Inflorescentiae* pseudospiculae ad nodos ramorum ramulorumque glomerulis dissitis congestae. *Pseudospiculae* vulgo usque ad 13 mm., interdum paene 18 mm. longae, primo subfusiformes. *Bractae gemmiparae* 2-3, ovatae obtusae apiculatae glabrae, infima circa 2 mm. longa, superioribus gradatim longioribus. *Spiculae* sesquiflorae, plus

minusve compressae, tenuiter chartaceae, pallide vel fusce stramineae, fere omnino glabrae, mox discedentes. *Glumae vacuae* 3–4, ovatae, obtusae, apiculatae, ventricosae, extus glabrae nitidaeque, infima 3–4 mm. longa, superioribus gradatim longioribus usque ad 7.5 mm. longis. *Lemma* fertile 9–10 mm. longum, ovatum, ventricosum, acutum, apiculatum, obscure plurinerve. *Palea* lemma aequans vel paullo longior, apice obtusa, dorso profunde sulcata, carinis subtiliter ciliata, prope margines apicemque asperella, rudimento apice acuminatissimo vulgo paleam paullo superante. *Rhachillae segmenta* omnia (supremo attenuato excepto) brevissima glabra, infra et inter glumas et infra lemma fertile tantum disarticulantia. *Lodiculae* crassae, dorso hispidulae, margine rigide ciliatae, obovatae, apice obtusae vel interdum subacutae, deorsum angustatae, subsimiles vel interdum posteriore multo angustiore et apice acuta. *Antherae* circa 5 mm. longae, lineares, muticae. *Ovarium* subtriquetrum elongato-obovatum, deorsum glabrum, apice tantum pericarpio crasso, duro, hispido, tectum. *Stigmata* 3, pilosa. *Fructus* maturus caryopsis glabra, 8 mm. longa, anguste ovoidea, basi rugosa quasi retorrida, dorso sulco profundo notata, sursum basi hispida styli coronata; *pericarpium* deorsum tenue, apice crassum durum.

TYPE: *W. T. Tsang* 30102, collected June 30, 1940, at Lung Waan. "Wild; occasional on dry clay soil, by roadside in forest; culms scandent, 16 Chi. ft. (6 m.) long." Chinese name (Cantonese): *T'ang Chuk*, i.e., Climbing Bamboo.

***Dinochloa alata* sp. nov.**

Species auriculis culmorum vaginarum subnullis *D. orenudae* McClure affinis, sed culmorum vaginis latere exteriori tenuiter chartaceis, laxis hiantisque, deorsum in alam amplam rotundatam excurrentibus, ligula margine longissime fimbriata aperte distincta.

Culmi scandentes usque et ultra 11 m. alti (teste Tsang); *internodia* fere solida, cylindrica, elongata, glabra, prope nodos inflata, infra nodos glauca, superioribus asperellis; *nodi* glabri, cicatrice collari gibboso prominente rugoso, glabro, 3–5 mm. lato instructi. *Culmorum vaginae* deciduae, latere exteriori nervosae, tenuiter chartaceae, laxae hiantaeque, et deorsum in alam amplam rotundatam excurrentes, alioquin arctae crassae induratae et nervos prominentes carentes, deorsum pilis mollibus adpressis pallide brunneatis leviter obsitae sensim glabrescentes, alioquin ab initio glabrae, supra versus apicem latum vel subtruncatum vel concavum leniter attenuatae; *auriculae* subnullae vel ad labiam angustissimam glabram redactae; *setae orales* nullae; *ligula* valida, dorso scabra, apice variabilis, margine processibus crassis rigidis glabris, in vagina quinta 15 mm., in superioribus usque ad 22 mm. longis, fimbriata; *lamina* persistens, valde reflexa, plana, subtenuis, anguste lanceolata, in vagina quinta quam vaginae ipsius dimidium longior, utrinsecus nervosa glabraque, margine subtiliter spinulosa. *Rami* ut in genere, internodiis glabris, nodis inflatis; vaginellis vel hispidulis vel glabris, demum deciduis. *Foliorum vaginae* glabrae; *auriculae* in vaginis superioribus nullae vel debilissimae, inferioribus plerisque valde evolutae, crassae reflexae, utrinque glabrae; *setae orales* radiatae usque ad 10 mm. longae tenues scabrae persistentes; *ligula* perbrevis, dorso scabriuscula, apice subrecta, margine inaequaliter denticulata; *petiolus* 1–2 mm. longus, utrinque glaber vel subglaber; *laminae* usque ad 20 cm. longae et usque ad 2.8 cm. latae, vel ovato- vel oblongo- vel lineari-lanceolatae, basi rotundatae, utrinque glabrae vel raro deorsum subtus secus tantum costam

pilis debilibus sparse obsitae; *venulae transversae* vulgo haud manifestae, raro obscurae, remotae, debiles. *Inflorescentiae* desideratae.

TYPE: *W. T. Tsang* 30410, collected Aug. 25, 1940, near Laan Aang Ts'uen. "Wild; occasional on dry clay soil at edge of a forested ravine; culms 30 Chi. ft. (11.24 m.) tall." Chinese name (Cantonese): *T'ang Chuk*, i.e., Climbing Bamboo.

Lingnania remotiflora (O. Ktze.) comb. nov.

Arundarbor remotiflora O. Ktze. Rev. Gen. Pl. 760. 1891.

Bambusa remotiflora O. Ktze. l.c. in syn.

Lingnania parviflora McClure, Lingnan Univ. Sci. Bull. 9: 37. 1940.

ANNAM: Turong [Tourane], *Otto Kuntze s.n.*, Feb. 1875. Cultivated; 30-50 ft.

Through the courtesy of the Curator of the Herbarium of the New York Botanical Garden, where Kuntze's herbarium is now deposited, I was able to examine the type (in two sheets) of Kuntze's species. Although the specimens are fragmentary, there is sufficient material to justify the assertion that the inflorescences show no character by which Kuntze's species can be distinguished from *Lingnania parviflora* McClure, the type of which was collected on the island of Hainan. Dr. A. Camus, who examined Kuntze's type at the request of Dr. E. D. Merrill, reduced this species to *Bambusa tuldoidea* Munro; see Merrill, *Brittonia* 2: 191. 1936.

In addition to the species here described as new, Tsang's 1940 collection includes three species described earlier from southern China and here reported for the first time from Indo-China:

Bambusa gibba McClure, Lingnan Univ. Sci. Bull. no. 9: 10. 1940.

Lung Waan; "wild; occasional on moist sandy soil near stream in forest. Culms 14 Chi. ft. (5.25 m.) tall." Chinese name (Cantonese): *Shui Wong Chuk*, i.e., Water Yellow Bamboo, *W. T. Tsang* 30164, collected July 19, 1940.

Lingnania cerosissima (McClure) McClure, Lingnan Univ. Sci. Bull. no. 9: 35. 1940.

Bambusa cerosissima McClure, Lingnan Sci. Jour. 15(4): 637. 1936.

Lung Waan; "Cult.; occasional near villages in dry clay soil; culms 30 Chi. ft. (11.24 m.) tall." Chinese name (Cantonese): *Taan Chuk*, i.e., Single (-node) Bamboo. *W. T. Tsang* 30153, collected July 5, 1940.

Schizostachyum pseudolima McClure, Lingnan Sci. Jour. 19(4): 537, pl. 39, 40. 1940.

Lung Waan; Laan Aang Ts'uen; Kau Kaai Ts'uen at foot of Kau Nga Shan; "Wild; occasional in dry clay or moist sandy soil; in forests; culms 10-16 Chi. ft. (3.75-6 m.) tall. Chinese names (Cantonese): *Pok Chuk*; *Pok Chuk Tsai*, i.e., Thin (-walled) Bamboo. *W. T. Tsang* 30119, collected July 2, 1940; *W. T. Tsang* 30322, collected Aug. 10, 1940; *W. T. Tsang* 30536, collected Sept. 28, 1940.

There may also be reported the following, from the Lingnan University Herbarium:

Schizostachyum hainanense Merr. ex McClure, Lingnan Sci. Jour. 14(4): 591. pl. 36 & 39, fig. 1. 1935.

Tonkin, without precise locality or other field notes. LU 19889 (*H. Fung*) collected Jan. 21, 1932.

Facilities and assistance made available by Mr. B. Y. Morrison, Principal Horticulturist in Charge, Division of Plant Exploration and Introduction, Bureau of Plant Industry, and by Dr. W. R. Maxon, the Curator, and Mrs. Agnes Chase, Custodian of Grasses, of the U. S. National Herbarium, have

been of the greatest value in the working up of this collection. Important specimens gathered by Joseph and Mary Strong Clemens in the vicinity of Hue, Annam, were lent by Dr. H. L. Mason, Curator of the Herbarium, University of California, for study and comparison. The continuation of our work on bamboo has been greatly facilitated by occasional grants-in-aid received from the National Research Council, the Rockefeller Foundation, and the China Foundation for the Promotion of Education and Culture.

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NOTES ON THE ROOTING OF SOME CONIFERS
FROM CUTTINGS*

KENNETH V. THIMANN AND ALBERT L. DELISLE

With one text-figure and one plate

SOME two years ago, the authors reported (1939) experiments on the rooting of "difficult" plants, including hemlock, Norway spruce, and white pine. In the course of the subsequent work, which was mainly directed to more general problems, observations have been made on the rooting of a number of other coniferous trees. While these data do not disclose any new principles, they provide information as to the relative ease of rooting of several important species and will therefore be reported briefly.

ABIES. Experiments were made from time to time over a period of 13 months, from March to April of the succeeding year, on two species of *Abies*, to determine (a) the optimum time for rooting, (b) the optimum auxin treatment. Cuttings were taken from trees in the Arnold Arboretum, of various ages between 12 and 50 years, and the results are averaged in table 1. Since treatment with sucrose had previously been found to be beneficial, the bases of the cuttings were in most cases immersed in 2% sucrose for 48 hours following auxin treatment. Where comparisons were made, sucrose treatment had a definite but small beneficial effect. In order to simplify the presentation, all the data in tables 1 and 2 refer to sucrose treatment unless otherwise indicated. Sucrose did not induce rooting in the summer months, and, in general, its effect was mainly in tending to improve the maintenance of the cuttings where rooting was taking place. Vitamin B₁ was completely without effect on the rooting of either of these species.

The superiority of the winter months is very evident, especially January for *Abies koreana*, and March for *Abies concolor*.

The optimum auxin treatment is less clear, although the cuttings are clearly capable of responding to auxin. However, it appears that at the time of year when rooting is slight, 100 mg. per litre is about optimal, while when rooting is vigorous, 200 mg. per litre is preferable.

Comparison of trees of different ages appears to show, at any rate without auxin treatment, that the decreasing responsiveness of older trees persists over a wide age range. The data for winter cuttings of *A. concolor* (sugar-treated) are summarized in table 2. While, in white pine, the ability to root well fades out at 4 to 5 years, in *Abies*, it apparently persists up to 18 years of age.

*These experiments were carried out under the auspices of the Maria Moors Cabot Foundation for Botanical Research.

TABLE 1.

PERCENTAGE ROOTING OF TWO *Abies* SPECIES.
All cuttings treated with auxin (or water) for 24 hours,
then 2% sucrose for 48 hours, except where marked †

Month in which cuttings were taken	Abies koreana			Abies concolor		
	Auxin concentrations in mg./l.					
	0	100	200	0	100	200
March 1938	0†	16†	5†	—	—	—
July 1938	0	0	0	0	0	0
August 1938	0†	7†	0†	0†	0†	0†
December 1938	—	—	—	2	18	7
January 1939	25†	33†	70†	—	—	—
March 1939 (mean of 2 collections)	0	18	17	19	68	43
April 1939	0	10	0	0	0	0

TABLE 2.

EFFECT OF AGE ON ROOTING OF *Abies concolor*
Mean value of cuttings taken in December and March. All cuttings
treated with 2% sucrose for 48 hours following auxin treatment.

Age in years	Percentage of Rooting	
	Water controls	auxin 100 mg./l.
12	40	72
18	10	35
25	0	15
47	0	80

Results obtained with *Abies pectinata* (silver fir) are remarkable for the slowness of the response to auxin treatment. Cuttings obtained from an old tree at Sandwich, Mass.² in January, and kept in sand, showed no change for 5 months. Rooting then began, and after 7 months about 25% of those treated with auxin had rooted, while controls showed no roots. After 12 months those which had been treated with indole-acetic acid 100 mg. per liter gave 31% rooting; with 200 mg. per liter 45% rooted in the same time.* The latter concentration gave slightly more extensive root systems, as shown by the representative cuttings in figure 1. Water controls showed only 6% rooting in the 12 months. Thus the effect of

²Obtained through the courtesy of Mr. Frank Sargent of The Massachusetts Department of Conservation, Bureau of Forestry.

a single 24-hour treatment only became observable many months afterwards, although it was ultimately of large magnitude. Cuttings whose base consisted of two-year-old wood, i.e. those cut at the base of the 1937 growth, rooted even better (4% in water, 27% in 100 mg. per liter and 80% in 200 mg. per liter after 12 months). Cuttings whose base consisted of three-year-old wood, however, rooted less than half as well as the standard one-year material. This species must thus be regarded, in the absence of more extended trials, as a relatively easily rooted plant.

As a whole it seems that the *Abies* species are capable of rooting in good percentage from old trees.

TSUGA. The good results previously reported on *Tsuga canadensis* L. taken in the fall from individual trees in the Arnold Arboretum, have since been found to be not obtainable with certain other trees. The response may, therefore, vary from clone to clone.³

A study of the effect of age of tree in *Tsuga diversifolia* gave the results summarized in table 3. Young trees⁴ gave excellent rooting on auxin treatment; old trees gave good values when taken in December, but not at other

TABLE 3.
Tsuga diversifolia. RESULTS AFTER 9-12 WEEKS IN SAND-PEAT MIXTURE.

Age of trees in years	Month in which cuttings were taken	Auxin concentration in mg./l.				
		0	25	100	200	400
3	December 1938	8	20	73	55	—
6	December 1938	4	25	50	63	—
42-60	December 1938	14	—	30	43	29
	March 1939	0	—	14	0	—
	August 1938	0	—	0	0	—

times. It will be noted that no effect of age is shown in the water controls with this species. This contrasts with the results previously found for *Pinus Strobus* and *Picea Abies*. On the whole *Tsuga diversifolia* cannot be regarded as among the most "difficult" of trees. A treatment with vitamin B₁ (0.5 mg. per liter), following auxin, had no effect on the number of cuttings rooted or on the size of the root systems and in two instances even slightly decreased the rooting. Representative cuttings are shown in figure 2. Actively growing terminal or subterminal branchlets were used.

³Zimmerman and Hitchcock (Contrib. Boyce Thompson Inst. 10: 474. 1939), in misquoting these results, lay emphasis on their finding for *Tsuga canadensis* that the age effect is "certainly not the principal limiting factor as claimed by Thimann and Delisle." As a matter of fact, the data we reported were with cuttings from old trees, *Tsuga canadensis* being one of the few conifers in which we found no effect of the age of the plant.

⁴Obtained through the courtesy of Verkade's Nurseries, Wayne, N. J.

PICEA. As with *Abies*, the rooting of blue spruce, *Picea pungens*, was followed at intervals throughout the year. A number of trees of medium age, 10–20 years, were used. Table 4 shows that no controls rooted at any

TABLE 4.

Picea pungens, AGED 10–20 YEARS. RESULTS AFTER 12 WEEKS IN SAND.

Month in which cuttings were taken	Auxin concentration in mg./l.		
	0	100	200
June 1938	0	0	0
August 1938 (two separate collections)	0	0	0
November 1938	0	43	27
February 1939 (two separate collections)	0	0	0
April 1939	0	80	57
June, July 1939	0	0	0

time, while a good response to auxin was obtained, limited to the winter and spring months. The optimum concentration is apparently 100 mg. per liter (when treatment is for 24 hours), the optimum time being in the spring. However, the absence of rooting on February cuttings suggests that data of a second season would be very desirable.

Picea Omorika, Serbian spruce, taken throughout the winter months, gave no rooting. Cuttings from four-year-old trees,⁵ however, gave moderate rooting. This plant presents one of the very few cases where we have obtained a real effect of treatment with vitamin B₁. As table 5 shows,

TABLE 5.

Picea Omorika. CUTTINGS TAKEN FROM TREES 4 YEARS OLD.
RESULTS AFTER 12 WEEKS IN SAND-PEAT MIXTURE.

Treatment	Auxin concentration mg./l.			
	0	25	100	200
Auxin (or water)				
24 hours, then water 24 hours	4	18	26	36
Auxin (or water)				
24 hours, then vitamin B ₁ , (0.5 mg./l.) 24 hours	17	30	49	66

cuttings treated with vitamin B₁ gave increased rooting at all auxin concentrations. The roots were also more numerous.

Some of the data of tables 1, 3 and 4 are summarized in the text-figure, which shows simply the highest percentage rooting obtained in each month,

⁵See above, (4)

irrespective of the auxin concentration used. In all cases, however, this was either 100 or 200 mg. per liter. The experiments are not numerous enough to define the optimum rooting times exactly, but the general trends are clear enough.

HIGHEST ROOTING EACH MONTH FOR 4 SPECIES OF CONIFERS—

AUXIN — 100 OR 200 MG. PER LITER

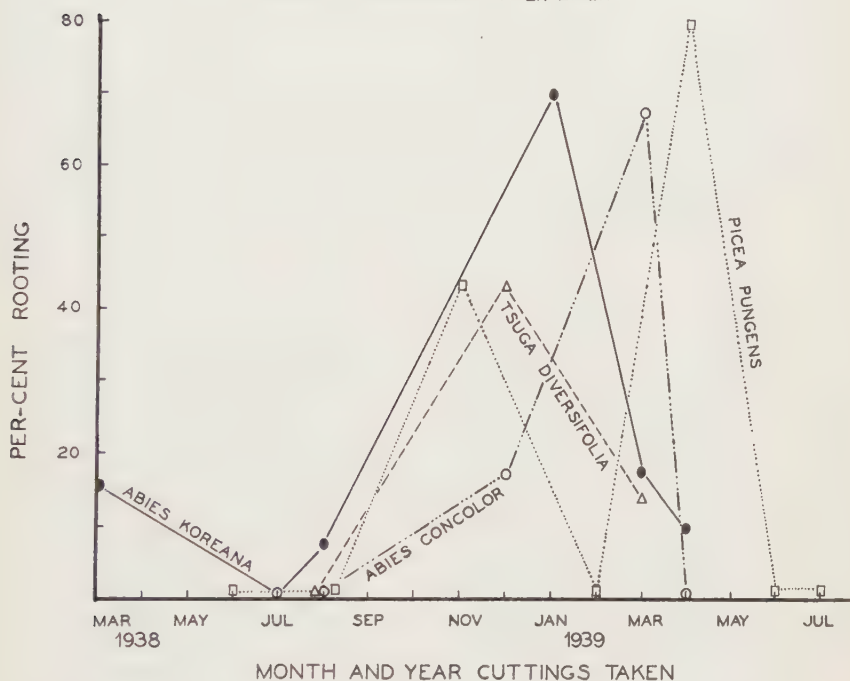


FIGURE 1

OTHER SPECIES. Table 6 gives data on three other trees considered as particularly interesting. It will be seen that *Podocarpus* roots readily, and *Sequoia* moderately so. Rooting of the latter from cuttings has, so far as the authors are aware, not been reported. Summer cuttings of *Sciadopitys* showed the unusual effect of a reduction in rooting by auxin treatment (cf. the results of Deuber and Farrar (1939, 1940) on *Picea Abies*). December cuttings behaved more normally. Vitamin B₁ was again without appreciable effect. Rooting of *Sciadopitys*, 4, 5, and 9 years old, has recently been reported by DeFrance (1938 a, b). Taking the data of tables 3-6 together, it is apparent that either 100 or 200 mg. per liter represents optimal auxin treatment for a number of trees.

An interesting observation was made on *Pinus Strobus* (white pine). Among a large number of cuttings, a few isolated brachyblasts or short

TABLE 6.
ROOTING OF OTHER CONIFERS.

Plant	Month	Age in years	Auxin concentration in mg./l.	Number of weeks required for rooting
			0 50 100 200	
Podocarpus neriifolia	March 1939	36	25 — 100 100	9-14
Sequoia sempervirens	March 1939	10	0 — 34 20	11
Sciadopitys verticillata	August 1938*	40	43 33 30 0	32
verticillata	December 1938	40	0 — 22 0	28
verticillata	December 1938 (treated with vitamin B ₁)	40	0 — 29 0	28

* Of the cuttings alive and unrooted 3 months later, one half of each group were given a biotin preparation; there was no effect.

shoots (needle bundles, or fascicles) became accidentally embedded in the peat-sand medium. Several of these rooted. The rooting of these individual brachyblasts was then studied further, and it was found that the brachyblasts from old trees show slight but definite rooting on auxin treatment, while those from young trees root very vigorously. Table 7 shows that up to 74% rooting (71 out of 97) eventually was obtained with 3-year-old trees. This is probably higher percentage rooting than would be given

TABLE 7.
PERCENTAGE ROOTING OF BRACHYBLASTS OF *Pinus Strobus*, TAKEN IN
NOVEMBER, TREATED 24 HOURS, THEN KEPT IN PEAT-SAND MIXTURE.

Age of tree in years	Auxin concentration in mg. per liter			Time of first rooting	Time of complete rooting
	0	50	100		
3	7.5	31	74	3 months	9 months
80	0.0	3	0.5	3½ months	3½ months

by ordinary cuttings. It is also remarkable that the effect of age of the tree is so clearly shown in this material. As mentioned in a preliminary report (Delisle, 1940) the rooted brachyblasts, transferred to soil, do not usually survive more than a few months, unless an active bud is already present. This fact would seriously limit the immediate application of this material in practical propagation. However, the whole phenomenon is now being



FIGURE 1



FIGURE 2

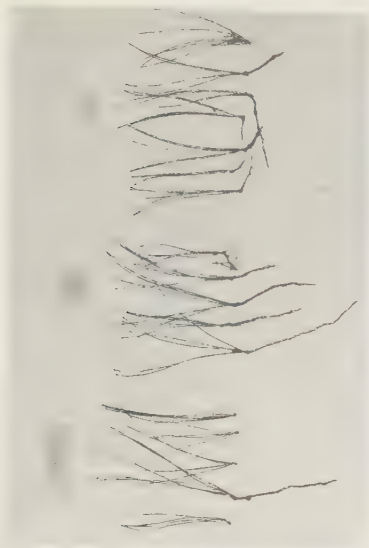
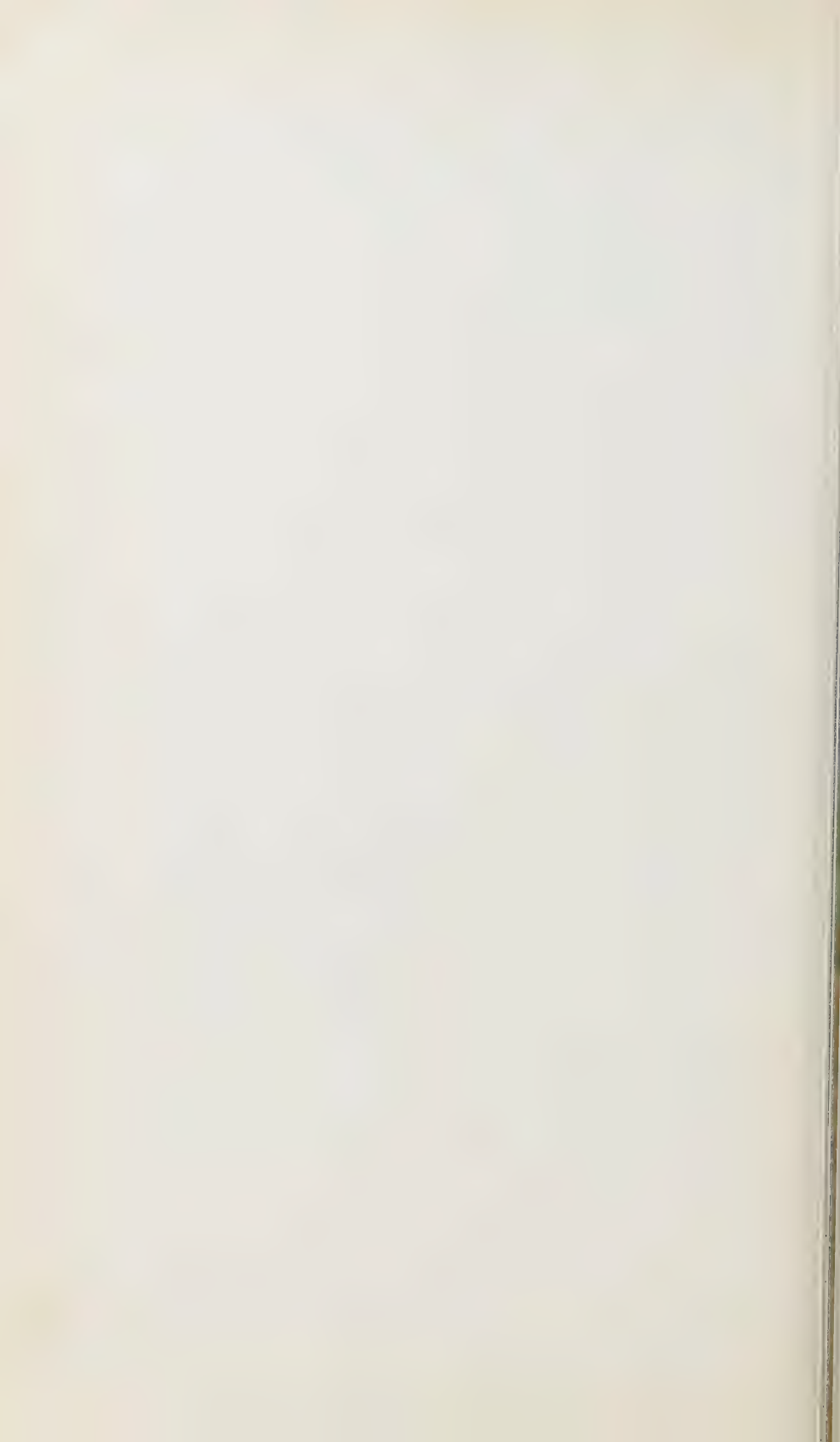


FIGURE 3



FIGURE 4

ROOTING OF SOME CONIFERS FROM CUTTINGS



investigated in more detail. Examples of rooted brachyblasts are shown in figures 3 and 4.

SUMMARY

1. Results on the rooting of cuttings of species of *Abies*, *Tsuga*, *Picea*, *Sequoia*, *Podocarpus*, *Sciadopitys* and *Pinus* are recorded.

2. Rooting was in all cases much higher in the winter months than in the summer, the optimal auxin treatment was either 100 or 200 mg. per liter (for 24 hours), and in extension of the results previously reported, a number of the species rooted considerably more freely when cuttings were taken from young trees than when taken from older stock.

3. In only one instance (*Picea Omorika*) did a treatment with vitamin B₁ noticeably increase the rooting percentage.

4. In *Pinus Strobus* the individual needle-bundles or brachyblasts form roots, particularly in response to auxin treatment, at least as readily as do ordinary cuttings.

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EXPLANATION OF PLATE

Figure 1. *Abies pectinata* (European silver fir). Left to right: control (water), 100, 200 mg. indole-acetic acid per liter for 24 hours. Cuttings from old tree. Photographed after 6 months in sand.

Figure 2. *Tsuga diversifolia* (Japanese hemlock). Left to right: control (water), 25, 100, 200 mg. indole-acetic acid per liter for 24 hours. Cuttings from trees 6 years old. Photographed after 10 weeks. No effect of B₁ treatment.

Figure 3. *Pinus Strobus* (white pine). Left to right: control (water), 50, 100 mg. indole-acetic acid per liter for 24 hours. Brachyblasts from trees 3 years old. Photographed after 9 months.

Figure 4. As figure 3. A well-rooted brachyblast from tree 80 years old.

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BONPLAND'S "DESCRIPTION DES PLANTES RARES CULTIVEES A MALMAISON ET A NAVARRE"

WILLIAM T. STEARN

AFTER the death of Etienne Pierre Ventenat in 1808 the Empress Josephine charged Aimé Jacques Alexandre Goujaud Bonpland (1773–1858)¹ with the management of her Malmaison estate near Paris and the description of its rare plants. In 1810, the Navarre estate near Evreux in Normandy was added to his charge. This had belonged in the fourteenth century to Jeanne de France, Reine de Navarre and Comtesse d'Evreux; after Josephine's repudiation by Napoleon in December 1809 it became her chief residence and she set out to create here a garden of rare and beautiful plants such as had been her joy at Malmaison. Pierre Joseph Redouté continued to paint them for her and Bonpland's "Description des Plantes rares cultivées à Malmaison et à Navarre" (folio, Paris) is a sequel to Ventenat's "Jardin de la Malmaison" (2 vols., folio; Paris, 1803–1805).² Both are beautifully illustrated by Redouté. The title-page of Bonpland's book bears the date '1813' but its publication neither began nor ended in that year. References to it in contemporary periodicals show that it

¹See "Aimé Bonpland, Médecin et Naturaliste, Explorateur de l'Amérique du Sud; sa Vie, son Oeuvre, sa Correspondence" (xcvi + 300 pages; Paris, c. 1906) for an account of Bonpland's extraordinarily varied and adventurous career. He was born at La Rochelle, France, in 1773 and died at Restauracion on the Argentine-Brazil frontier in 1858, having settled in South America after the fall of Napoleon. According to Hamy, the family name dating back to the sixteenth century was Goujaud and the name of Bonpland, later Bonpland, was not adopted until about 1778 by Aimé's father, Simon Jacques Goujaud, upon whom it had originally been bestowed as a nickname in allusion to the fact that his father had planted a "bon plant de la vigne" upon the date of his birth:—"Michel Goujaud-Levasseur faisait planter de la vigne . . . lorsqu'on vint lui annoncer la naissance de son deuxième fils Simon-Jacques. Il se serait alors écrié tout joyeux: 'Dieu soit loué! voilà un bon plant! Et pour célébrer la naissance de ce fils, il mit en terre un sarment qui, distingué de tous les autres, fut le bon plant de la vigne. Pour faire allusion à cet incident on désigna dans la famille Simon-Jacques sous le nom de *Bonplant* qui lui resta."

The dates of publication of Humboldt and Bonpland, "Voyage aux Régions équinoxiales, Botanique" (Paris, 1805–34) are given by C. D. Sherborn and B. B. Woodward in Jour. Bot. **39**: 202–205 (1901), and by J. H. Barnhart in Bull. Torrey Bot. Club **29**: 585–598 (1902) and Jour. Bot. **42**: 153–156 (1904). For "Humboldt and Bonpland's Mexican Itinerary" see T. A. Sprague in Kew Bull. **1924**, pp. 20–27, with map; for "Humboldt and Bonpland's Itinerary in Venezuela" see N. Y. Sandwith in Kew Bull. **1925**, pp. 295–310; for "Humboldt and Bonpland's Itinerary in Colombia" see T. A. Sprague in Kew Bull. **1926**, pp. 23–30; these three papers are of great value in fixing the type-localities of species based upon specimens of Humboldt and Bonpland's collecting.

²Of Ventenat's "Jardin de la Malmaison," tt. 1–30 were published in 1803, tt. 31–78 in 1804, tt. 79–84 in Dec. 1804 or Jan. 1805, tt. 85–120 in 1805; for fuller details see Stearn in Jour. Soc. Bibl. Nat. Hist. **1**: 200–201 (1939).

appeared in 11 livraisons (parts) between 1812 and 1817; these notices state the number of plates and sheets of text contained in each part, and the plate- and page-numbers given below have accordingly been deduced from these:—

B.F. = Bibliographie de France (Paris); F.T.G. = Fortsetzung des Allgemeinen Deutschen Garten-Magazins (Weimar); G.A. = Göttingische gelehrte Anzeigen (Göttingen); J.L.F. = Journal général de la Littérature de France (Paris).

Livr. 1, pp. 1-16, tt. 1-6	1812 (Nov. or Dec.)	B. F. 1 : 809 (25 Dec. 1812); J. L. F. 16 : 4 (1813).
Livr. 2, pp. 17-32, tt. 7-12	1813 (Aug. or Sept.)	B. F. 2 : 406 (24 Sept. 1813); G. A. 1814 . 2 : 1185 (1814).
Livr. 3, pp. 33-48, tt. 13-18	1814 (Jan.)	B. F. 3 : 26 (28 Jan. 1814).
Livr. 4, pp. 49-60, tt. 19-24	1814 (Nov. or Dec.)	B. F. 3 : 396 (17 Dec. 1814); J. L. F. 18 : 2 (1815); F. T. G. 1 : 212 (1815).
Livr. 5, pp. 61-76, tt. 25-30	1815 (April or May)	B. F. 4 : 225 (20 May 1815); J. L. F. 18 : 164 (1815).
Livr. 6, pp. 77-88, tt. 31-36	1815 (June or July)	B. F. 4 : 316 (22 July 1815); J. L. F. 18 : 227 (1815); F. T. G. 2 : 39 (1816).
Livr. 7, pp. 89-100, tt. 37-42	1816 (June or July)	B. F. 5 : 313 (20 July 1816); J. L. F. 19 : 226 (1816).
Livr. 8, pp. 101-120, tt. 43-48	1816 (Aug. or Sept.)	B. F. 5 : 394 (14 Sept. 1816); J. L. F. 19 : 290 (1816); F. T. G. 2 : 149 (1818).
Livr. 9, pp. 121-144, tt. 49-54	1816 (Oct. or Nov.)	B. F. 5 : 505 (23 Nov. 1816); J. L. F. 20 : 2 (1817).
Livr. 10, pp. 145-152, tt. 55-60	1816 (Nov. or Dec.)	B. F. 5 : 553 (21 Dec. 1816); J. L. F. 20 : 36 (1817).
Livr. 11, pp. 153-157, tt. 61-64	1817 (Mar.-April)	B. F. 6 : 202 (12 April 1817); F. T. G. 2 : 152 (1818).

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STUDIES IN THE LAURACEAE, IV
PRELIMINARY STUDY OF THE PAPUASIAN SPECIES
COLLECTED BY THE ARCHBOLD EXPEDITIONS

CAROLINE K. ALLEN

THIS study includes the Lauraceae from Papuasias in the larger sense. The species below are based principally on the three Brass collections from British and Netherlands New Guinea. Included also are the Brass and Kajewski Solomon Islands specimens and those of Kajewski from the New Hebrides. Some of the Waterhouse plants from Papuasias as well as a few numbers of the Carr collection from New Guinea are cited. It is by no means an exhaustive study, but complete only in so far as the limited amount of material at hand has allowed. Of the large number of lauraceous species described by Teschner in 1923, based on the collections of Schlechter and of Ledermann from Northeastern New Guinea, there were only two types available for study.

The following abbreviations are used indicating in which herbaria the specimens cited are to be found: AA = Arnold Arboretum, Harvard University; G = Gray Herbarium, Harvard University; NY = New York Botanical Garden Herbarium. Thanks are due to the Curators of these herbaria for generous loan of material for study.

Cinnamomum Blume

Cinnamomum solomonense, spec. nov.

Arbor ad 15 m. alta, ramulis glabris striatis rubescentibus. Folia opposita vel subopposita, elliptica, 12–20 cm. longa, 4.5–8 cm. lata, coriacea, acuminata vel attenuato-acuminata, basi anguste cuneata, glabra, triplinervia, nervis utrinque prominentibus quam lamina supra pallidioribus subtus obscurioribus, nervis lateralibus circa 0.5–1 cm. supra basin laminae divergentibus, ad apicem evanescentibus, venis transversis supra inconspicuis subtus conspicuis, petiolis 15–17 mm. longis rubescentibus glabris. Inflorescentia subterminalis, cymoso-paniculata, plus minusve laxa, quam folia brevior, ad 10 cm. longa, ramulis rubescentibus glabrescentibus. Flores ultimi 2–3, dense sericeo-canescenti-pilosi, 3 mm. longi, perianthii lobis pallide viridibus fide coll., pedicellis dense canescenti-pilosis, 3 cm. longis tenuibus. Fructus immaturus, in sicco rubescente-brunneus, glaber, ovoideus, apiculatus, ad 15 mm. longus, 12 mm. latus, calyce crasso ruguloso glabro 10–12 mm. longo undulato suffultus.

SOLOMON ISLANDS: Bougainville: Buin, Kugumaru, *Kajewski 1815* (TYPE, AA), alt. 150 m., common in rain-forest, June 6, 1930 (medium-sized tree up to 15 m. high, flower small, petals light green; fruit immature); Koniguru, *Kajewski 2137* (AA), alt. 900 m., common in rain-forest, Aug. 23, 1930 (small tree up to 8 m. high; fruits green with light minute spots on surface; seeds fleshy, purple in colour, very much like an *Eugenia*; length of fruit including calyx 2 cm., diameter at widest place 1.4 cm.)

(AA); Siwa, *Waterhouse 126* (Yale ser. no. 22837) (AA), Nov. 1932 (small native spice tree with scented bark; leaf glossy; common name: "Enu").

The species differs vegetatively from *C. Massoia* (Becc.) Schewe, its closest relative, if we admit the latter into the genus *Cinnamomum*. Judging from the scant descriptions of literature, differences are apparent in the elliptic or lanceolate leaves (those of *C. Massoia* having a definite tendency towards an oblanceolate condition) and the unmistakable triplinerviate condition (that of *C. Massoia* being according to Schewe¹ semi-trinerviate). *Cinnamomum xanthoneurum* Bl. is in the same group with the two latter-mentioned species, but may be distinguished readily by the canescent-sericeous underleaf surface and the fact that the lateral nerves begin to branch shortly after the middle of the leaf, whereas in *C. Massoia* and *C. solomonense* they remain unbranched until they approach the apex of the leaf.

Kajewski 2137 has been included under this species even though the leaves of that number are on the whole longer than those of the type; the flowers of the former are in a younger stage and the bark of the branchlets gives forth a faint sweetish odor, whereas that of the type is odorless.

***Cinnamomum Clemensii*, spec. nov.**

Arbor parva, ramulis vetustioribus glabris, junioribus sparse pubescentibus, striatis rubescentibus. Folia opposita late elliptica, 10–13 cm. longa, 4–6.5 cm. lata, subcoriacea, acuminata, glabra, juventute haud pubescentia, triplinervia, nervis subtus prominentibus, juventute pubescentibus, mox sub glabrescentibus, nervis lateralibus ad basin vel circa 4 mm. supra basin laminae divergentibus, venis transversis subparallelis supra haud, subtus conspicuis, petiolis ad 10 mm. longis rubescentibus, pubescentibus mox glabris. Inflorescentia axillaris cymoso-paniculata, quam folia brevior plus minusve pauciflora, ad 10 cm. longa, flavo-brunneo-pubescentia (in sicco rufescenti-pubescentia) pedunculis tenuibus rubescentibus. Flores 2–3 dense pubescentes, \pm 3 mm. longi, subsessiles (?). Fructus ignotus.

NORTHEASTERN NEW GUINEA: Morobe District, Yunzaing, *Clemens 3867* (TYPE, AA), alt. 1370 m., forest hills, August 15, 1936 (small tree, flower buds dull brown-yellowish; leaf pale under surface).

The species is outstanding because of the slender inflorescence, few-flowered, long-peduncled for the most part, and with dense brownish red pubescence. The latter is unusual, for in the majority of herbarium specimens of other species the pubescence appears yellowish, greyish or even fuscous. The affinity of the species, not close at best, seems to be with not one but several species from Malaysia.

***Cinnamomum Archboldianum*, spec. nov.**

Arbor ad 6 m. alta, ramulis glabris striatis griseis, ultimis rubescentibus. Folia opposita vel subopposita, lanceolata ellipticave, variabilia, 7–12 cm. longa, 2.5–4 cm. lata, subcoriacea, attenuate subacuminata subcaudatave, falcata, glabra, juventute subtus pallide glaucescentia, triplinervia, nervis prominentibus lateralibus circa 3–5 mm. supra basin laminae divergentibus ad apicem evanescentibus, reticulata, petiolis ad 1 cm. longis rubescentibus

¹O. Schewe in Engl. Bot. Jahrb. 58: 494. 1923.

glabris. Inflorescentia (racemosa?) quam folia brevior, ad 5 cm. longa. Flores ignoti. Fructus in sicco rubescenti-brunneus, glaber, ovoideus, apiculatus, 10–12 mm. longus, 8–9 mm. latus, calyce gracili crasso dilatato sparse pubescente minusquam 1 mm. longo 4 mm. lato suffultus.

NETHERLANDS NEW GUINEA: Hollandia, *Brass* 8953 (TYPE, AA), alt. 30 m., open second growth on steep dry slopes, July 7, 1938 (tree 5–6 m. high; leaves very prominently 3-nerved).

From description, this species seems most closely related to *C. Englerianum* Schewe. However, it differs in not having reddish branchlets throughout; also there seems to be no trace of the flavo-sericeous pubescence characteristic of the inflorescence of *C. Englerianum*; finally, the conspicuous transverse venation occurring at a definite angle of 60 degrees in the latter species is obscure in *C. Archboldianum*. The leaf-size of *C. Englerianum* is not given by Schewe, and so it is impossible to compare the two on that point.

Superficially *C. Archboldianum* has the appearance of *C. Burmanni* (Nees) Blume from eastern Asia and Malaya, in the leaf shape and variation in size of leaf. The infructescence is similar, as is the fruit, the latter differing only in the somewhat undulate margin of the shallow cupule, as opposed to the definitely partite cupule of *C. Burmanni*. The bark of the branchlets of *C. Burmanni* is reddish brown rather than greyish as in *C. Archboldianum*.

Phoebe Nees

Phoebe Clemensii, spec. nov.

Arbor magna (30 m. alta), diam. 30–60 cm., ramulis juventute striatis dense ferrugineo-tomentosis demum crassis glabris, foliorum delapsorum cicatricibus conspicuis magnis et lenticellis conspicuis notati griseis vel rubescentibus. Folia ad apicem ramulorum plus minusve fasciculata vel subverticillata, obovata, 15–17(–24) cm. longa, 7–9 cm. lata, subcoriacea, (acuminate vel breve acuminata) ad basin attenuata, basi subrotundata vel subauriculata, raro obtusa, supra costa pubescente excepta glabra, leviter ferrugineo-pubescentia, penninervia, nervis 12(–15), satis arcuatis supra impressis subtus elevatis conspicuis, reticulata, petiolis 5–10 mm. longis pubescentibus. Inflorescentia axillaris ex foliorum ultimorum axillis, vel subterminalis, cymoso-paniculata, pauciflora, ad 22 cm. longa, longepedunculata, pedunculis \pm 13 cm. longis, breviter tomentosa. Flores ultimi 2–3, dense tomentosi, 5–6 mm. longi, in sicco pallide brunnescentes, perianthii lobis utrinque pubescentibus, pedicellis dense tomentosis \pm 2 mm. longis. Infructescencia crassa, glabrescens. Fructus viridis fide coll., glaucus, glaber, ovoideus, apice obtusus, minute apiculatus, 1.5×1 cm., calyce ligneo crasso persistente subtentus, pedicello ad 2.5 cm. lato incrassato.

NORTHEASTERN NEW GUINEA: Morobe District, Sattelberg, *Clemens* 1072 (TYPE, fl., AA), alt. 1000–1200 m., Dec. 3, 1935; *Clemens* 615 (AA), alt. 900 m., forest hills, Oct. 24, 1935 ("big tree," diameter breast high 30–60 cm.; flower dull yellow). BRITISH NEW GUINEA: Central Division, Dini, Ononge Road, *Brass* 3829 (fruit, AA), alt. 500 m., rain-forest, April 21, 1933 (tree about 30 m. tall, with grey lenticellate bark and tough yellowish wood; leaves clustered at branch ends; peduncles and pedicels red; fruit smooth, green, covered with glaucous bloom).

The parts of the description in parentheses were taken from the Brass number and not from the type. *Clemens 615* is a much smaller-leaved specimen, but the typical leaf-base, the inflorescence with its pale tan tomentose pubescence, and the scarred branches, bearing leaves at their tips, place it without doubt in the above species. *Phoebe Clemensii* is very close to *P. novo-guineensis* Teschn. and to *P. Forbesii* Gamble. In fact, all three are very closely related. Having no specimens of either one, it is necessary to rely on the descriptions. The new species is separated at once from both the others by the abruptly acuminate leaves, roundish to subauriculate at the base, and by the inflorescence being 13–20 cm. long. The leaves of both *P. Forbesii* and *P. novo-guineensis* are more or less acuminate and are acute, cuneate, or attenuate at the base, and the inflorescences are 10–15 cm. long.

The nearest relative outside of New Guinea, as far as can be ascertained from literature, is *Phoebe macrophylla* Bl., from Malaysia, which again has larger leaves with petioles usually much longer (1–2.5 cm.).

Nothaphoebe Blume

Nothaphoebe Archboldiana, spec. nov.

Arbor ad 30 m. alta, ramulis glabris teretibus irregulariter sulcatis griseis, junioribus paullo angulatis striatis rubescentibus vel olivaceis. Folia subverticillata, obovata, 9–18 cm. longa, 2.5–7 cm. lata, coriacea, juniora chartacea, minute pellucido-punctata, obtusa vel obtuse acuminata, basi attenuato-cuneata, penninervia, nervis 8–10 utrinque sub conspicuis, reticulata, subtus reticulo quam supra conspicuiore, petiolis crassis sulcatis ad 1 cm. longis griseis glabris, junioribus gracilibus rubescentibus. Inflorescentia axillaris, cymoso-paniculata, laxa, ad 7 cm. longa, glabra, 3-flora, pedunculis ad 3.5 cm. longis. Flores 2–2.5 cm. longi, albi, margine ciliolato excepto glabri, pedicellis \pm 1 cm. longis gracilibus tubiformibus glabris post anthesin purpurascens fide coll. Fructus ruber, fide coll., in sicco nigrescens, glaber, ellipsoideus, 4.2×2.2 cm., pedicello crasso ad 2 cm. longo apice 4 mm. crasso griseo.

BRITISH NEW GUINEA: Lower Fly River, Sturt Island, *Brass 8134* (TYPE, AA), abundant and more or less gregarious on frequently inundated flood plains, Oct. 1936 (tree 30 m. high, developing a complicated maze of slender aerial roots arched over the base silt, the bark thick, grey, lenticellate, the wood pale yellow; flowers white, the pedicels purple after flowering; fruit smooth, red, 4.2 cm. long \times 2.2 cm. diameter; only meagre material available); Wame River, Purari Delta, *Brass 1081* (AA), river bank, rain-forest, Feb. 28, 1926 (shapely tree, 30 ft.; fruit elongated, white, pink-tinted). NETHERLANDS NEW GUINEA: 4 km. sw. of Bernhard Camp, Idenburg River, *Brass & Versteegh 13118* (AA), alt. 850 m., rare in primary rain-forest of the flat plain, March 7, 1939 (tree 31 m. high, the diameter 73 cm., the crown not widespreading, the bark 14 mm. thick, light brown, fairly smooth, the sap-wood orange, the heart-wood brown-yellow; fruit rose). NORTHEASTERN NEW GUINEA: *Schlechter 18322* (AA), Oct. 3, 1908 (in den Galleria Wäldern am Renija).

This is the first species of *Nothaphoebe* to have been noted from Papuasias. The profusion of obovate subverticillate leaves, the characteristic perianth with the outer cycle of lobes much smaller than the inner, and the typical fruit seated on an enlarged pedicel from which the floral parts have disappeared stamp the species unmistakably as *Nothaphoebe*. The collections

available at present are all placed in one species, despite a few differences. *Brass* 1081 from British New Guinea, for example, varies from the others in height.

Actinodaphne Nees

Actinodaphne tomentosa Teschner in Engl. Bot. Jahrb. **58**: 384. 1923.

Inflorescentia (*Clemens* 3983) in toto dense pallide ferrugineo-sericea, umbellulis subsessilibus 1–3 (?). Flores, pedicellis 3–4 mm. longis, perianthii lobis 4, ligulatis, ciliatis, \pm 3 mm. longis, extus longe-pubescentibus, intus glabris, ovario 2–3 mm. longo, obovoideo, glabro. Fructus brunneo-viridescens, glaber globosus, apiculatus, 7–8 mm. diametro, calyce incrassato, 5–6 mm. lato distenso, pubescente, suffultus, pedicello 5–6 mm. longo, incrassato. (*Clemens* 4613, 5144).

NORTHEASTERN NEW GUINEA: Kaiserin Augusta Fluss, Schraderberg, *Ledermann* 11895 (TYPE Berlin, not seen), alt. 2070 m., June 1, 1914; Wälder am Goridjoa, *Schlechter* 19818 (ISOSYNTYPE, AA), alt. 1200 m., June 13, 1909; Morobe District, Yunzaing, *Clemens* 3983 (fruit, AA), alt. 1370 m., forest hills, Aug. 25, 1936 (small plant, polelike; fruit green); same locality, *Clemens* 3749 (AA), alt. 1675 m., forest mountain, July 31, 1936 (small tree 5–7.7 cm. diam. breast high; flower-buds khaki-yellow; leaf pale bluish beneath); Ogeramang, *Clemens* 4613 (fr. AA), alt. 1765 m., forest hills, Dec. 15, 1936 (small tree, diam. breast high 2.5–5 m.; fruit green); same locality, *Clemens* 5144 (fruit, AA), alt. 1705 m., forest above rivulet, Jan. 26, 1937 (small-medium tree, diam. breast high 12.7 cm., fruit green).

Clemens 3983 has only ♀ flowers, which are too mature for complete description of staminodia and ovary, but very probably the plant may be found to belong to *Neolitsea*. I have examined in detail *Schlechter* 19818 and find no flowers with 6 perianth lobes, as described by Teschner for the species. However, *Ledermann* 4895 may have been the sheet chosen by Teschner as the type and he may have drawn up his description from that sheet. The majority of Teschner's new species of *Actinodaphne* from New Guinea are described by him as having a six-lobed perianth. Except for the above species I have seen no material of Teschner's species. Hence, I cannot definitely conclude that the latter belong in *Neolitsea* rather than *Actinodaphne*. The descriptions, however, would indicate that such is the case.

Actinodaphne Brassii, spec. nov.

Arbor parva, ramosissima, ramulis glabrescentibus, ferrugineo-pubescentibus evanidis, nodis exceptis striatis, brunnescentibus viride-brunneisve. Folia verticillata in nodo quove 5–6, plerumque lanceolata, 13–17 cm. longa, 2.5–3 (raro 4) cm. lata, juventute chartacea, maturitate subcoriacea, ad apicem attenuata, rare attenuate acuminata, pallida, maturitate margine undulata, supra in sicco pallida, subtus griseo-glauca, supra glabra subtus glabra vel leviter glabrescentia, penninervia, costa utrinque conspicua, subtus glabrescente, nervis 10–15 inconspicuis, minute reticulata, petiolis juventute ferrugineo-pubescentibus, mox glabrescentibus. Inflorescentia ∞ fasciculata umbellulata vulgo internodalis, ♂ in toto pallide brunneo-sericea, 3–5 umbellulis pedunculatis, pedunculis 10–14 cm. longis, gracilibus pubescentibus, umbellulis 3–5-floris. Flores virides fide coll., \pm 4 mm. longi pedicellis 2–5 mm. longis, perianthii lobis 5, ovatis, interioribus ciliatis punctatis. Inflorescentia ♀ ignota. Infructescentia pubescens mox glab-

rescens, umbellulorum pedunculis 6 mm. vel brevioribus longis, pedicellis \pm 5 mm. longis. Fructus viride-flavescens, pallide maculatus fide coll., glaber, compresses globularis, apiculatus, 7–9 mm. longus, 9–10 mm. latus, calyce ruguloso pubescente, \pm 2 mm. longo, suffultus.

SOLOMON ISLANDS: *Y s a b e l*: *Tasia*, *Brass* 3290 (TYPE, AA), common on rocky foreshores, Dec. 6, 1932 (small much-branched tree; young foliage flaccid and drooping, yellow-green; upper side of leaves dull green, the lower side grey; flower green; common name: "Tula"). *Florida* (*N'gela*): Northern end of island, *Brass* 3505 (AA), plentiful in coastal rain-forests, Jan. 25, 1933 (small tree with thin brown bark and pale yellowish wood; leaves undulate, the under side grey; fruit smooth, greenish yellow, with pale mottlings).

A species characteristic in the group because of the lanceolate leaves that have a greyish undersurface. It is very close to *A. solomonensis* Allen, but differs in leaf characters and in the presence of longer peduncles of the umbellules.

***Actinodaphne Archboldiana*, spec. nov.**

Arbor, ramulis fusco-glabrescentibus hinc inde glabratis, striatis, brunneis. Folia verticillata, in nodo quove 5–6, elliptica elliptico-lanceolatave, 14–20 cm. longa, 3.5–7 cm. lata, subcoriacea, subacuminata, longe acuta vel acuta, in sicco nigrescentia, supra glabra nitida, subtus sparse pubescentia mox glabrescentia, glauca fide coll., penninervia, nervis 8–10, utrinque conspicuis prominentibus, subtus parce pubescentibus, ad marginem arcuatis evanidis, venis transversis utrinque inconspicuis, petiolis ad 1.5 cm. longis, fuscentibus, pubescentibus mox glabrescentibus. Inflorescentia ∞ fasciculata umbellulata, vulgo internodalis, \varnothing in toto dense cano-sericea, 3–5 umbellulis pedunculatis, pedunculis ad 6 mm. longis, gracilibus, pubescentibus, umbellulis 3–5-floris. Flores ad 3 mm. longi, pedicellis 1–4 mm. longis, perianthii lobis 6, ovatis ciliatis, extus pubescentibus, intus glabris. Inflorescentia δ et fructus ignoti.

BRITISH NEW GUINEA: Middle Fly River, Lake Daviumbu, *Brass* 7493 (TYPE, AA), common sub-canopy tree of poorer type of rain-forest, Aug. 1936 (underside of leaves glaucous).

According to Teschner's key, the new species falls into the verticillate-leaved group, in the bracket "*Petoli tomentosi*," with one other species, *A. tomentosa* Teschner. Although the pubescence on the petioles of the leaves of *A. Archboldiana* is sparse, it is evident that the petioles have become glabrescent with age. *Actinodaphne Archboldiana* is easily separated, however, by the absence of tomentum on the branchlets and the under surface of the leaves. The only other described verticillate-leaved species from New Guinea are *A. nitida* and *A. latifolia*, both described by Teschner, with glabrous petioles. *Neolitsea Vidalii* Merr. from the Philippines, based on *Litsea verticillata* Vidal, is probably an *Actinodaphne* and very closely related to *A. Archboldiana*.

***Actinodaphne solomonensis*, spec. nov.**

Arbor parva ad 15 m. alta, ramulis glabris striatis, viride-brunneis, maculatis. Folia verticillata in nodo quove 5–6, elliptica elliptico-lanceolatave, 14–20 cm. longa, 4–6 cm. lata, subcoriacea, acuminata, longe acuta vel acuta, supra glabra pallida, subtus nervis sparse pubescentibus exceptis

glabra fide coll. cano-argentea, penninervia, nervis 7–10 utrinque conspicuis prominentibus, subtus parce pubescentibus ad marginem arcuatis evanidis, venis transversis utrinque inconspicuis, petiolis 13–20 mm. longis, fuscentibus, pubescentibus mox glabrescentibus. Inflorescentia ∞ fasciculata umbellulata, vulgo internodalis, δ in toto brunneo-sericea, (3?–)5 umbellulis pedunculatis, pedunculis 4–9 mm. longis, gracilibus pubescentibus umbellulis 3–5-floris. Flores virides fide coll., pedicellis \pm 5 mm. longis, perianthii lobis 5, ovatis, interioribus ciliatis, quam exterioribus brevioribus, extus pubescentibus punctatis. Inflorescentia φ et fructus ignoti.

SOLOMON ISLANDS: Bougainville: Buin, Kugumaru, *Kajewski 1889* (TYPE, AA), alt. 150 m., rain-forest, June 30, 1930 (small tree up to 15 m. high; leaves white, silvery underneath; buds green, with green sepals, petals, and stamens; wood used for building native houses; common name: "Nagi-a").

This species differs from *A. Archboldiana* in having glabrous green-brown branchlets. Its leaves are glabrous except for the nerves on the lower surface, which are glabrescent to glabrous, and white silvery beneath, not blackening as in *A. Archboldiana*. The herbarium specimens show only a suspicion of glaucosity beneath. On the whole, the petioles of *A. solomonensis* are longer. The δ flowers of *A. solomonensis* are larger than the φ flowers of *A. Archboldiana*; the pubescence of the latter is more brown than whitish.

Neolitsea Merrill

Neolitsea Archboldiana, spec. nov.

Arbor parva, 4–5 m. alta, ramulis brunneo-rubrescentibus, glabris. Folia subverticillata, elliptico-lanceolata, 12–15 cm. longa, 3.5–5 cm. lata, chartacea, longe acuminata subcaudatave, utrinque glabra supra pallide subtus glauca fide coll., penninervia, nervis 4–6, plus subtus quam supra elevatis, utrinque reticulata. Inflorescentia δ , ∞ umbellulis breviter pedunculatis vulgo internodalis, 5-floris, bracteis 4, pellucidis extus pubescentibus intus glabris, pedicellis \pm 1 mm. longis, perianthii lobis 4, ligulatis pellucidis, extus pubescentibus intus glabris, staminibus 6. Inflorescentia φ et fructus ignoti.

NETHERLANDS NEW GUINEA: 15 km. sw. of Bernhard Camp, Idenburg River, *Brass 12357* (TYPE δ , AA), alt. 1700 m., common in undergrowth of rain-forest gullies, Jan. 1939 (tree 4–5 m. high; leaves very glaucous underneath; flowers yellow).

A species distinguished by long acuminate or subcaudate leaves and glabrous branches and leaves. Perhaps it is near *Teschner's Neolitsea acuminata*, but the leaves are not obtusely acuminate and are larger. It approaches also *N. glabra* *Teschner*, but again the leaves are larger, and the costa is only slightly impressed above, if at all.

Neolitsea Brassii, spec. nov.

Arbor 6–7 m. alta, ramulis rubescentibus striatis glabris. Folia alternata, ovata vel elliptico-ovata vel elliptica, 6–9 cm. longa, 3–5 cm. lata, subcoriacea, obtusa vel obtuse acuta, utrinque glabra, opaca subtus grisea, triplinervia, nervis in jugo infimo oppositis ad 0.7 cm. supra laminae basin divergentibus, supra pallidis subtus conspicuis nigrescentibusque, costa supra medium arborescente, venis transversis haud conspicuis, reticulata,

petiolis 1–1.5 cm. longis gracilibus, pubescentibus mox glabris, rubescentibus. Inflorescentia δ , ∞ umbellulis pedunculatis axillaribus internodalibusque, pedunculis 1–2 mm. longis, 3-floris, bracteis 4, extus pubescentibus intus glabris, pedicellis 3 mm. longis, pubescentibus, perianthii lobis 4, ovatis laceratis, 3 mm. longis extus paullo pubescentibus intus glabris. Inflorescentia⁹ φ et fructus ignoti.

BRITISH NEW GUINEA: Western Division, Tarara, Wassi Kussa River, *Brass* 8704 (TYPE δ , AA), common in outskirts of rain-forest, Jan. 1937 (tree 6–7 m., leaves grey underneath; flowers yellow).

Neolitsea Brassii is a distinct species, judging from the descriptions of other species, in that it has the triplinerved venation typical of eastern Asiatic species. It stands out also in perianth characters. The four lobes are only slightly pubescent and are not strap-shaped and acute at the apex but more ovate. The number of flowers in the umbel is less than appears to be usual in the case of the New Guinean species.

Neolitsea Teschneriana, spec. nov.

Arbor parva 6 m. alta gracilis, ramulis gracilibus dense adpresse ferrugineo-pubescentibus. Folia plus minusve subverticillata, elliptico-ovata, 7–12 cm. longa, 3–5.5 cm. lata, chartacea, acuta vel acuminata, saepe falcata, supra sparse minuteque pilosa, pallida, subtus dense ferrugineo-pilosa (praesertim juvenilia), triplinervia, nervis lateralibus 2–5 supra haud subtus prominentibus pubescentibusque, venis transversis subtus aliquid conspicuis, petiolis ad 1 cm. longis dense pubescentibus. Inflorescentia δ , umbellulis sessilibus vulgo internodalibus, immatura in toto ferrugineo-pubescentibus 5-umbellulis subsessilibus bracteis 4, perianthii lobis 4, ligulatis ciliatis 2 mm. longis extus pubescentibus intus glabris, staminibus 6(?). Inflorescentia φ immatura, ∞ umbellulis sessilibus, vulgo internodalibus, ferrugineo-pubescentibus.

NORTHEASTERN NEW GUINEA: Morobe District, Sattelberg, *Clemens* 824 (TYPE δ , AA), alt. 900 m., Nov. 8, 1935 (tree 6 m., slender; flowers yellowish; fruit dark or black); same locality, *Clemens* 1255, alt. 750–990 m., Dec. 19, 1935. BRITISH NEW GUINEA: Owen Stanley Range, between Mts. Brown and Clarence, *Brass* 1510 (φ , AA), alt. 1220–1525 m., May 19, 1926 (tall virgate bush; leaves grey below; flowers white, in lateral clusters).

This species is distinct because of the rusty brown dense appressed pubescence on the slender branchlets and the lower surface of the leaves and petioles. Due to the fact that the flowers are immature, the exact number of stamens is uncertain. From the type of inflorescence and the perianth lobes, and with the data which can be gleaned from the young flowers, it is probable that the number of stamens is six, in accordance with related species of *Neolitsea*.

Clemens 1255 is undoubtedly the same species, but the leaves for the most part appear to be smaller than those of the type. *Brass* 1510 shows slight differences in the less triplinerviate condition of the leaves, but the pubescence, type of inflorescence, etc., make it impossible to associate the number with any other known species or to set it apart as a distinct one. The species is named in honor of Prof. H. Teschner, who has contributed the major portion of the published taxonomic work on Papuan Lauraceae.

Litsea Lamarck***Litsea fulvosericea***, spec. nov.

Arbor 32 m. alta, ramis glabrescentibus, ramulis minute pubescentibus angulatis ad nodos complanatis brunnescentibus. Folia alternata, elliptica, (4-)8-11.5 cm. longa, (2-)4-5.5 cm. lata, coriacea, obtusa vel subrotundata et leviter retusa, basi attenuata acuta supra glabra, juniora glabrescentia, subtus adpresse fulvo-sericeo-pubescentia, penninervia, nervis 7-8 supra inconspicuis impressis subtus elevatis plus minusve pubescentibus, venis transversis subparallelis inconspicuis, petiolis crassis 0.5-1 cm. longis fuscis minute pubescentibus. Inflorescentiae ♂ et ♀ ignotae. Infructescentia axillaris et caulina, racemosa, ad 3 cm. longa, minute plus minusve fulvo-pubescentia, ad 5-fructigera, pedunculis crassis \pm 1 cm. longis pubescentibus. Fructus ruber fide coll., glaber, ellipsoideus, apice basique attenuatus, 0.1×0.8 cm., calyce undulato patente discoideo glabrescente 6 mm. diam., pedicello crasso 2-3 mm. longo pubescente.

NETHERLANDS NEW GUINEA: 6 km. sw. of Bernhard Camp, Idenburg River, *Brass & Versteegh 12520* (TYPE fruit, AA), alt. 1200 m., frequent in forest of the slopes, Feb. 15, 1939 (tree 32 m. high, diameter 40 cm.; crown not widespreading; bark 8 mm. thick, brown, scaly; sapwood light brown; heartwood red-brown; fruit dark red).

The most outstanding feature of the species is the fulvous appressed sericeous pubescence on the lower leaf-surface. The small fruits, occurring in racemes on the branchlets or in leaf axils, and subtended by a rigid flaring calyx that is at once disc-like and fluted, present other distinguishing characters.

Litsea crenata, spec. nov.

Arbor magna, ramulis glabris, junioribus griseo-brunneo-pubescentibus, teretibus cicatricosis, cicatricibus foliorum delapsorum striatis griseo-murinis, junioribus rubescentibus, novellis subferrugineo-tomentosis. Folia alternata, irregulariter elliptica, raro subobovata, 6.5-9 cm. longa, 3-4.5 cm. lata, coriacea, obtusa vel obtuse subacuminata, raro acuta, basi cuneata vel obtusa, supra costa et nervis exceptis glabra, subtus pubescentia mox glabrescentia, penninervia, nervis 4-6(-7), inaequalibus, nervis et costa supra impressis canescentibus, junioribus plus minusve subferrugineo-pubescentibus, subtus elevatis subferrugineo-pubescentibus, utrinque minute reticulata, petiolis ad 1.5 cm. longis varie pubescentibus rubescentibus. Inflorescentia ♂ et ♀ ignotae. Infructescentia caulina, ut videtur 1-umbellata, ad 3 cm. longa, pallide brunnescentia, glabrescentia, pedunculis \pm 5 mm. longis. Fructus niger et nitidus fide coll., glaber, ellipsoideus, apiculatus, 1.8×1.2 cm., calyce crasso undulato-crenato, glabrescente vel glabro, griseo-brunneo 4 mm. longo, 3 mm. crasso.

BRITISH NEW GUINEA: Central Division, Bella Vista, *Brass 5469* (TYPE fruit, NY; AA), alt. 1450 m., large tree in oak forest, Nov. 8, 1933 (fruit black, shining). NORTH-EASTERN NEW GUINEA: Morobe District, Yunzaing, *Clemens 6561A* (AA), alt. 1370 m., June 18, 1937; same locality, *Clemens 6445* (AA), June 21, 1937.

On the whole, the Clemens plants have leaves more glabrous and less irregular as to outline and venation. The specimens are in a younger stage than those of the type, the fruit being immature. Temporarily, at least, they are referred to *L. crenata*. The undulate-crenate disc or calyx subtending the ellipsoid fruit is a good character. The grayish brown or

murinus branchlets, which in the young stages, as well as the young leaves, are covered with almost a ferrugineous pubescence, present another distinction.

***Litsea breviumbellata*, spec. nov.**

Arbor parva, ramulis glabris, junioribus breviter ferrugineo-tomentosis, teretibus striatis griseis vel murinis. Folia alternata, lanceolato-elliptica vel leviter et anguste obovata, 9.5–13.5 cm. longa, 4–5 cm. lata, subcoriacea, acuta vel leviter subacuminata, basi obtusa vel subrotundata, supra costa et nervis exceptis glabra, subtus pubescentia, penninervia, nervis 8–10, supra impressis subtus conspicuis elevatis ferrugineo-tomentosis, venis transversis subparallelis conspicuis, utrinque minute reticulata, petiolis gracilibus ad 1.2 cm. longis ferrugineo-tomentosis mox glabrescentibus. Inflorescentia ♂ axillaris et caulina, fasciculata, 1–3 umbellata, ad 8.9 mm. longa, pedunculis gracilibus 3–4 mm. longis pubescentibus. Flores 4–8(–?), \pm 3.5 mm. longi, ferrugineo-pubescentes, staminibus exsertis, pedicellis \pm 2 mm. longis pubescentibus. Inflorescentia ♀ axillaris et subterminalis, caulina, fasciculata, 1–3(–?), umbellata, plerumque singula persistens, ad 8 mm. longa, ferrugineo-pubescentis, pedunculis 2–3 mm. longis pubescentibus. Flores ♀ 3–4(–?), \pm 3.5 mm. longi, ferrugineo-pubescentes, pedicellis \pm 1 mm. longis. Infructescentia \pm 2 cm. longa, glabrescens, pedunculis crassis ad 1 cm. longis. Fructus probabiliter immaturus?, viridibrunnescens, glaber, ovoideus, apiculatus, 8×5 mm., calyce parvo discoideo \pm 4 mm. diam., pedicello paullo crasso pubescente \pm 3 mm. longo.

BRITISH NEW GUINEA: Middle Fly River, Lake Daviumbu, *Brass* 7585 (TYPE ♂, AA), Aug. 1936 (small tree of rain-forest substage); same locality, *Brass* 7700 (♀, fruit, AA), in 1936 (rain-forest substage tree).

For the relationships of this species one must look to the Chinese and Indian floras. Most outstanding are the short umbels and exserted stamens of the ♂ flowers, and the warm, light rust color of their pubescence and that of the leaves as well, in the dried state at least. The ♀ flowers are smaller than the ♂ and the branchlets of the former are less grey than reddish brown, with a tendency toward more pubescence in the older parts. Otherwise both specimens are much the same.

***Litsea alveolata*, spec. nov.**

Arbor 5–8–15 m. alta, ramis erectis fide coll., ramulis glabrescentibus angulatis striatis griseo-nigrescentibus, junioribus breviter brunnescentelanatis. Folia alternata, subrotundata, plus minusve rotundato-ovata, elliptica, 7 mm.–9 cm. longa, 6 mm.–4 cm. lata, percoriacea, apice basique rotundata, saepe leviter obtuse subacuta, margine revoluta, brunnea fide coll., supra costa nervisque exceptis glabra, juniora pubescentia, subtus dense breviter brunneo-lanata, penninervia, nervis 4–6 (plerumque 5) 30° sub angulo divergentibus, supra perimpressis subtus elevatis brunneis utrinque pubescentibus supra inconspicue subtus conspicue et prominenter alveolata, petiolis crassis \pm 1 cm. longis fuscis pubescentibus. Inflorescentia ♂ axillaris et terminalis (?) umbellato-racemosa, ad 3 cm. longa, umbellis ad 10, infimis mox deciduis, 3–4 apicalibus persistentibus pubescentibus, bracteis 4 pubescentibus glaucis, pedunculis 1–3 mm. longis pubescentibus. Flores \pm 2, 2–2.3 mm. longi, flavi fide coll., extus longe sparseque ferrugineo-pubescentes, intus glabri, perianthii lobis 6–8-ciliolatis. Inflorescentia

♀ ignota. Infructescentia ut videtur terminalis, brevis, \pm 3.5 cm. longa, glabra, plerumque fructum unicum maturante. Fructus brunescens, in sicco nitidus, rugosus, glaber, ellipsoideus, apice basique attenuatus, apiculatus, \pm 2.5 cm. longus, \pm 1.3 cm. latus, calyce crasso patenti-discoideo glabro \pm 1 cm. diam., pedicello crasso griseo rugoso \pm 5 mm. longo, 5–6 mm. lato.

NETHERLANDS NEW GUINEA: Lake Habbema, 3225 m. camp, *Brass* 9559 (TYPE ♂, fruit, AA), alt. 3225 m., common in mossy closed forest, Aug. 1938 (tree 5–8 m. high; branches erect; foliage brown); 9 km. ne. of Lake Habbema, 2800 m. camp, *Brass* 10708 (♀ AA), alt. 2800 m., plentiful in forest substage, Oct. 1938 (tree attaining 15 m.; flowers yellow).

This species is very close to *L. Versteeghii* Allen, the main difference being the size of the leaves. The former has leaves usually 8–9 cm. long, the latter 3–4 cm. long. Both, however, have the same range in leaf length. The lateral nerves of *L. alveolata* tend to branch at an angle of 30° , whereas those of *L. Versteeghii* approach 45° . *Litsea Versteeghii* has longer inflorescences with a larger number of flowers persisting at the tip, but on the bracts enclosing the umbels on both species there is a conspicuous bloom. The ultimate reticulation of the leaves of *L. Versteeghii* is rather more coarse and more apparent on the upper surface than the fine alveolate condition of those of *L. alveolata*. On the lower surface of *L. alveolata* the heavy lanose pubescence, instead of obscuring the alveoli, makes them even more striking.

***Litsea Versteeghii*, spec. nov.**

Arbor ad 25 m. alta, ramulis glabrescentibus mox glabris, junioribus dense pallide brunneo-tomentosis, rimosi griseis. Folia alternata, elliptica, ad 10.5 cm. longa, 4–5.5 cm. lata, coriacea, rotundata vel obtusa, supra nervis costaque exceptis glabra, subtus dense mollissime pubescentia, mox sparse pubescentia, penninervia, nervis 5–7 utrinque pubescentibus mox glabris supra impressis subtus elevatis, venis transversis subtus conspicuis, supra areolata, subtus conspicue reticulata, petiolis crassis ad 1.5 cm. longis, fuscis glabrescentibus, junioribus dense pubescentibus. Inflorescentia ♂ axillaris, in axillis foliorum delapsorum umbellato-racemosa, ad 6.5(–8) cm. longa, umbellis numerosis, infimis mox deciduis, 3–12 apicalibus maturantibus pubescentibus \pm 4-floribus, bracteis 4 extus pubescentibus glaucis pubescentibus conspicue venosis, ciliolatis glanduloso-punctatis, pedunculis ad 1 cm. longis pubescentibus. Flores 3–4 mm. longi, extus longe rubescenti-pubescentes, minute punctati. Inflorescentia ♀ et fructus ignoti.

NETHERLANDS NEW GUINEA: Bele River: 18 km. ne. of Lake Habbema, 2200 m. camp, *Brass & Versteegh* 11162 (TYPE ♂, AA), alt. \pm 2400 m., rare tree of secondary forest, on the slope of a ridge, Nov. 25, 1938 (tree 25 m. high, diam. 35 cm.; crown not widespread; bark 3 mm. thick, fairly smooth; wood soft brown; unopened flowers green; open flowers brown); same locality, *Brass* 11466 (AA), alt. 2450 m., occasional tree in forest undergrowth, Nov. 1938 (tree 5–6 m. high; leaves stiff, glaucous underneath; flowers brown).

This species is unusual in that the umbels of the lower two-thirds of the raceme are deciduous, only about twelve or less remaining on the stalk. The umbels themselves are rather long, pedunculate, and subtended by pubescent glaucous bracts. The leaves are areolate above, softly pubescent

and glaucous below, and reticulate. The branches are greyish with longitudinal fissures which may indicate lenticels. Only occasionally are the fissures horizontal. In spite of the difference in the height of the tree, there seems to be no doubt that *Brass 11466* is conspecific with the type. The collection represents an earlier stage than the type, for the umbels have not yet fallen from the lower part of the raceme.

***Litsea papillosa*, spec. nov.**

Arbor parva, ad 15 m. alta, ramulis glabris subteretibus striatis griseis, junioribus fuscis. Folia alternata, oblonga vel oblongo-elliptica, ad 12 (?) cm. longa, ad 6 cm. lata, subcoriacea, acuta, basi acuta vel cuneata, utrinque glabra, supra obscure, subtus conspicue dense minuteque papillosa, penninervia, nervis plicatinerviis 4-5 supra paullo elevatis subtus conspicue elevatis, costa supra impressis, subtus elevatis, venis transversis supra conspicuis subtus satis obscuris, petiolis aliquid crassis, canaliculatis ad 8 cm. longis fuscis glabris. Inflorescentia ♂ breve, axillaris et caulina, brachypodiis brevibus, subumbellatis sessilibus fasciculatis glabris 5 mm. longis. Flores post anthesin pallide virides fide coll. Inflorescentia ♀ ignota. Infructescentia ad 2 cm. longa, glabra, ad 7-fructigera. Fructus aurantiacus, glaber, subglobosus, apiculatus, 8×6.5 mm. (fide coll. 10×9 mm.) calyce crassato discoideo 3 mm. diam. subtentus, pedicello crassato ad 7 mm. longo basi 1 mm., apice 2 mm. diam., brunnescente glabro.

SOLOMON ISLANDS: Guadalcanal: Uulolo, Tutuve Mt., *Kajewski 2563* (TYPE ♂, AA), alt. 1200 m., common in rain-forest, April 24, 1931 (small tree up to 15 m. high; flower light green; fruit orange when ripe, length 1 cm., diameter 9 mm., with circle at end; the kernels of this fruit are eaten by the natives; common name: "Com com").

Although the leaves are fragmentary and there are no flowers left, the characters of this species are such that it must be recognized at once as new. The papillose or glandular condition of the subcoriaceous, more or less oblong leaves, few-veined and plinerviate, are distinctive. The numerous inflorescences borne in fascicles on short brachypods represent a character easily recognised. There is a possibility that this might be a *Lindera*, but the leaves and general habit seem to deny it a place in this genus, and so for the present I place it in *Litsea*.

***Litsea habbemensis*, spec. nov.**

Arbor 29 m. alta, ramulis glabrescentibus mox glabris, junioribus pallide denseque adpresse ferrugineo-pubescentibus angulatis ad nodos complanatis, striatis nigrescentibus. Folia alternata, variatim elliptica, ad 11 cm. longa, ad 5 cm. lata, coriacea, subacuminata vel subacuta, basi cuneata, raro rotundata, raro inaequalia, utrinque glabra, in sicco subcastanea, penninervia, nervis 4-6, supra impressis subtus elevatis, obscure plicatinerviis, venis transversis parallelis subtus conspicuis, supra conspicue subtus obscure reticulata, petiolis gracilibus 2 cm. longis, nigrescentibus pubescentibus mox leviter glabrescentibus. Inflorescentia ♂ axillaris, subumbellato-racemosa, umbellis inferioribus cito deciduis, ad 3 cm. longa, ferrugineo-pubescentibus, bracteis 4, umbellis 2-8, 5-6 mm. longis. Flores ± 5 , ad 5 mm. longi, flavi, fide coll., adpresse sericeo-fulvo pubescentes, pedicellis 3 mm. longis adpresse fulvo sericeo pubescentibus. Inflorescentia ♀ et fructus ignoti.

NETHERLANDS NEW GUINEA: Bele River, 18 km. ne. of Lake Habbema, 2200 m. camp, *Brass & Versteegh 11155* (TYPE ♂, AA), alt. \pm 2350 m., occasional in primary rain-forest, Nov. 22, 1938 (tree 29 m. high, diameter 33 cm.; crown not widespreading; bark 6 mm. thick, grey, rough; wood dark yellow; flowers yellow).

The numerous pedunculate umbels, pale reddish brown in color, and the glabrous reticulate leaves, more or less castaneous below, present a striking contrast with the blackish angled branchlets somewhat flattened at the nodes. The venation of the leaves is very well defined. The costa and lateral nerves are as conspicuous above by being extremely impressed as below by being elevated.

***Litsea morobensis*, spec. nov.**

Arbor, ramis glabris teretibus striatis griseis brunneo-maculosis, ramulis breviter rubescenti-pubescentibus subangulatis. Folia opposita, lanceolata, 6.5–17 cm. longa, 2.5–5 cm. lata, coriacea, obtusa, raro obtuse subacuminata vel retusa, basi obtusa, supra glabra, subtus rubescenti-pubescentia, penninervia, nervis 5–8, supra impressis subtus elevatis brunnescentibus, venis transversis supra magis obscuris subtus conspicuioribus, subtus reticulata, petiolis 1–2.5 cm. longis rubescentibus minute pubescentibus. Inflorescentia ♂ axillaris et caulina, fasciculata, umbellata, 0.5–2 cm. longa, minute rubescenti-pubescentia, pedunculis gracilibus ad 1.5 cm. longis, bracteis 4, rubescenti-pubescentibus glanduloso-punctatis, marginibus scariosis, ciliolatis. Flores \pm 3 extus rubescenti-pubescentes. Inflorescentia ♀, ♂ similes. Fructus ignotus.

NORTHEASTERN NEW GUINEA: Morobe District, Ogeramngang, *Clemens 5327A* (TYPE ♂, AA), alt. 1765–1830 m., Feb. 8, 1937; *5539* (♀, AA), alt. 1765 m., March 1, 1937.

The specimens are poor, but do not match any other known species. There is a similarity to several Pacific Island species, but variation appears on detailed examination. There seems to be no outstanding characters that mark the species as distinct. More abundant material will probably reveal distinctions or place it within the limits of an already known and variable species.

***Litsea perlucida*, spec. nov.**

Arbor magis gracilis 20 m. alta, ramulis glabris teretibus striatis griseo-rubrescentibus. Folia alternata, late elliptica, (12–)15–18 cm. longa, (6.5–)10–10.5 cm. lata, coriacea, utrinque rotundata, saepe retusa, utrinque glabra, supra perlucida, subtus leviter glauca fide coll., utrinque in sicco castanea, penninervia, nervis \pm 8, infimis \pm 30° sub angulo divergentibus utrinque conspicuis flavo-brunneis, fide coll., in sicco brunneis supra planis subtus leviter elevatis, costa crassa utrinque conspicua subtus elevata, petiolis crassis 2.5–4 cm. longis nigrescentibus glabris. Inflorescentia ♂ axillaris et caulina, fasciculata, 1–2-umbellata, ad 1.5 cm. longa, glabra, pedunculis gracilibus \pm 1 cm. longis, bracteis \pm 6, extus pilosis marginibus scariosis glandulo-punctatis. Flores \pm 5, \pm 3 mm. longi, pallide flavi, fide coll., perianthii lobis extus pubescentibus glanduloso-punctatis, staminibus \pm 12. Inflorescentia ♀ et fructus ignoti.

BRITISH NEW GUINEA: Central Division, Mafulu, *Brass 5378* (TYPE ♂, AA), alt. 1100 m., common in second storey of tall lower level forest, Oct. 26, 1933 (rather slender tree 20 m. high; bark dark brown, finely scaly; leaves glossy, slightly glabrous (glaucous?) underneath, the nerves conspicuous, yellow-brown; flower pale yellow).

Very striking is this species, glabrous except for leaf buds and flowers. The very broadly elliptical glossy leaves, rounded at base and apex, with conspicuous yellow nerves, in dried state brownish against the lighter chestnut of the leaf blade, are supported by stout glabrous black petioles up to 4 cm. long. The foliage and black petioles present a strong contrast to the greyish branchlets exfoliating to show here and there patches of red.

Litsea Brassii O. C. Schmidt in White in Jour. Arnold Arb. **10**: 214. 1929.

BRITISH NEW GUINEA: Lower Fly River, Gaima (E. bank), *Brass* 8286 (AA), common in rain-forest outskirts, Nov. 1936 (small tree 4-5 m. high; leaves greyish pubescent below).

Litsea bernhardensis, spec. nov.

Arbor \pm 30 m. alta, ramulis minute denseque atro-rubescenti-pubescentibus angulatis. Folia alternata, obovata, 18-23 cm. longa, 12-14 cm. lata, subcoriacea, acuta vel abrupte obtuse acuminata, basi rotundata, raro subaequalia supra glabra, subtus glauca, sparse atro-rubescenti-pubescentia, in sicco viridescenti-brunnea, penninervia, nervis 8-10, supra impressis subtus elevatis conspicue atro-rubescenti-pubescentibus, venis transversis supra obscuris subtus conspicuis subparallelis, petiolis crassis, ad 4.5 cm. longis minute atro-rubescens. Inflorescentia δ et φ ignotae. Infructescentia axillaris et caulina, breviter pedunculata, 1-2 umbellata, ad 4 cm. longa, atro-rubescens, umbellis pedunculis crassis. Fructus sessiles, virides fide coll., glaber, subglobosus, apiculatus, 11×10 cm., calyce discoideo crasso rugoso-striato glabro \pm 8 mm. diam., tubo \pm 1 cm. longo rugoso-striato, apice \pm 6 mm. lata.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass & Versteegh* 13568 (TYPE, AA), alt. 570 m., occasional tree of primary rain-forest on the slope of a ridge, April 13, 1939 (tree \pm 30 m. high, diameter 51 cm.; crown not widespreading; bark 15 mm. thick, brown, scaly, rough; wood brown; fruits green).

So outstanding is the fruiting specimen of this species that there seems to be no doubt that it is new. The large obovate leaves are dark on the herbarium specimen and rather sparsely covered on the lower surface with reddish black curly pubescence. The same type of pubescence, but shorter and closer, is found on the branchlets and petioles. The venation of the leaves is also reddish black. The short disc-like calyx and the thickened tube are also distinctive.

Litsea Whiteana, spec. nov.

Arbor ad 20 m. alta, ramulis ferrugineo-pubescentibus mox glabrescentibus demum glabris teretibus striatis pallide rubescenti-brunnescentibus. Folia alternata, elliptica vel obovata, 17-21 cm. longa, 8.5-10 cm. lata, chartacea vel leviter subcoriacea, acuta vel obtusa, supra glabra, subtus sparse pubescentia, in sicco subcastanea, penninervia, nervis \pm 15 supra impressis subtus elevatis pubescentibus rubescentibus, inferioribus subhorizontalibus ad apice sub angulo 45° divergentibus, costa supra conspicua leviter canaliculata subtus elevata rubescentia, venis transversis subtus leviter elevatis, supra minute punctata, subtus reticulata, petiolis crassis \pm 2 cm. longis rubescentibus dense breviter ferrugineo-pubescentibus mox glabris. Inflorescentia δ immatura, axillaris et caulina, subfasciculato-7-10-umbellata, ad 1-1.5 cm. longa, dense breviter ferrugineo-pubescentibus,

bracteis 4 canescentibus sparse rubescenti-pubescentibus, pedunculis \pm 5 mm. longis umbellarum pedunculis \pm 5 mm. longis. Flores solitarii, immaturi, perianthiis nullis, staminibus numerosis \pm 15. Inflorescentia \varnothing breviora, quam σ , fasciculato-10-14+-umbellata, umbellarum pedunculis \pm 1.5 mm. longis, bracteis 4 extus sparse pubescentibus glanduloso-punctatis marginibus scariosis. Flores solitarii, subsessiles, \pm 2.5 mm. longi, perianthiis nullis vel abortivi, staminodiis numerosis, \pm 16, variabilibus, ovarium probabiliter ovoideum, pubescens, stigmatibus sessili, pseudo-peltato, fimbriato, crenulato. Fructus ignotus.

SOLOMON ISLANDS: Bougainville: Koniguru, Buin, *Kajewski* 2034 (TYPE σ , AA), alt. 850 m., common in rain-forest, Aug. 7, 1930 (medium-sized tree up to 20 meters high; buds green; sepals green; receptacle red; stamens numerous, cream green; wood used for rafters in ceremonial houses; common name: "Kokitie-kegie"); Kugumaru, Buin, *Kajewski* 1922 (\varnothing , AA), alt. 150 m., common in rain-forest, July 4, 1930 (medium-sized tree up to 20 meters high; buds green; common name: "Mar-gul-ah-tuku").

A large-leaved species with reddish brown branchlets. The leaves of the \varnothing specimen are larger than those of the σ and are more nearly chartaceous than subcoriaceous; also the pubescence throughout is more dense.

The species is named for Mr. C. T. White, Government Botanist of the Brisbane Botanical Gardens, long interested in the Papuanian flora.

***Litsea perglabra*, spec. nov.**

Arbor ad 20 m. alta, ramulis glabris teretibus dense striatis griseis vel pallide rubescentibus. Folia alternata, elliptica, (12-)14-21 cm. longa, (6.5-)7-9.5 cm. lata, coriacea, obtusa, raro retusa, basi acuta, inaequalia, glabra, in sicco viridescenti-castanea, penninervia, nervis \pm 8 utrinque conspicuis, in sicco rubescentibus subtus elevatis, costa supra impressa subtus conspicuis elevatis, petiolis sat crassis ad 3.5 cm. longis rubescentibus glabris. Inflorescentia σ immatura, axillaris, fasciculata, 5+-umbellata, ut videtur breviter pedunculata, ad 8 mm. longa, minute brunneo-pubescentis, bracteis pubescentibus glanduloso-punctatis. Flores \pm 4, perianthii lobis extus pubescentibus, glanduloso-punctatis. Inflorescentia \varnothing ignota. Infructescentia \pm 5 cm. longa, glabra, 1-2-fructigera fide coll. Fructus ruber, maculosus fide coll., glaber, ellipsoideus, 3×2 cm., calyce patelliformi, rigido leviter undulato glabro, in sicco brunneo, pallide guttato striato 4 mm. longo 2 cm. diam., pedicello crasso 4 mm. longo apice 6 mm. lato, pedunculo crasso striato brunneo 6 mm. longo.

SOLOMON ISLANDS: Guadalcanal: Berande, *Kajewski* 2414 (TYPE σ , AA), common in rain-forest at sea level, Jan. 6, 1931 (large tree up to 20 m. high; well advanced flower buds only on specimens; this timber is used by the natives in house-building); San Cristoval: Waimamura, *Brass* 2714 (fruit, AA), common in rain-forest on coastal hills, Aug. 22, 1932 (erect tree 10 m. high, with thin brown bark; leaves glaucous below; petioles, midrib and main nerves yellowish; fruit solitary or in lateral prs. below leaves, 4.5 cm. long by 2.5 cm. diam., smooth, dark mottled red, resting in an enlarged truncate calyx).

So close is this species seemingly to *L. perlucida* (described above) that it was set apart as distinct with some hesitation. The main reason was the difference in number of petals and stamens. *Litsea perlucida* has eight petals and sixteen or more stamens, whereas *L. perglabra* has four petals and about twelve stamens. The obvious difference is the shape of the leaves,

their other characteristics being the same. Brass mentions in the field notes for number 2714 the glaucous lower leaf surface and the yellowish nerves.

***Litsea solomonensis*, spec. nov.**

Arbor ad 20 m. alta, ramulis glabris teretibus striatis rubescentibus griseo-maculatis, junioribus rubescentibus sparse pubescentibus. Folia alternata, late lanceolata, saepe oblique, 12-15(-20) cm. longa, 3.5(-6.5) cm. lata, chartacea vel subcoriacea, obtusa vel attenuato-acuta, saepe mucronata utrinque glabra, subtus argentea fide coll., penninervia, nervis ad 6, gracilibus supra pallidis subtus leviter elevatis sub angulo $\approx 45^\circ$ divergentibus, supra plus minusve reticulata, petiolis ad 1.5 cm. longis fuscis glabris. Inflorescentia δ axillaris vel caulina, fasciculata, 2-3 umbellata, ad 2.3 cm. longa, minute pubescens, bracteis 4, ciliolatis marginibus scariosis glanduloso-punctatis laceratis, pedunculatis gracillimis ad 1.5 cm. longis. Flores ≈ 5 , 6-7 mm. longi, extus pubescentes, albi, fide coll. Inflorescentia η ignota. Infructescentia ad 3 cm. longa, pedunculis crassis glabrescentibus. Fructus rubescens, maculatus fide coll., glaber, compresso-globosus, 1.5 cm. longus, 1.2 cm. latus fide coll., cupula 4 mm. longa, 1.2 cm. diam., glabrescente minute tuberculata, pedicello crasso fusco ad 4 mm. longo.

SOLOMON ISLANDS: *Y s a b e l*: Maringe, *Brass 3183* (TYPE δ , AA), alt. 150 m., rain-forests on limestone hills, Nov. 23, 1932 (tree 20 m. tall; bark greenish tuberculate, brown when cut; leaves pale, slightly grey beneath; flowers white; common name: "Nolahi"). *B o u g a i n v i l l e*: Marmaromino, *Kajewski 2200* (fruit, AA), alt. 50 m., common in rain-forest, Sept. 29, 1930 (medium-sized tree up to 20 meters high; leaves green on top, silvery underneath; fruit pink, green when ripe; calyx adhering to fruit, length 1.5 cm., diameter 1.2 cm., flattened at one end and covered with light spots; common name: "Lu-ellia"); same locality, Kugumaru, Buin, *Kajewski 1846* (AA), alt. 150 m., common in rain-forest, June 10, 1930 (large tree up to 20 meters high; leaves silvery beneath; well advanced green flower-buds only on specimen; common name: "Tuge-lear"). *S a n C r i s t o v a l*: Waimamura, *Brass 2652* (AA), one tree seen in lowland rain-forest, Aug. 15, 1932 (tree 50 ft. tall, with thin brown bark marked with narrow slightly raised horizontal lines; wood soft, yellow; leaves stiff, grey below; unripe fruit bright red; ripe fruit reddish black, about 1.5 cm. diam.; fruiting calyx coloured green). *G u a d a l c a n a l*: Ma-massa, Konga, *Kajewski 2470* (AA), alt. 500 m., common in rain-forest, Feb. 8, 1931 (medium-sized straight-barrelled tree up to 20 m. high; fruit plum-coloured when ripe, length 1.5 cm. diam. 1.4 cm., with a flattened end; the bark of this tree is macerated with water and applied to sore legs; common name: "Arli-arli"). *M a l a i t a*: Quoi-mon-apu, *Kajewski 2350* (AA), common at sea level in rain-forest, Dec. 13, 1930 (medium-sized tree up to 20 m. high; leaves silvery underneath; bracts green, enclosing 5 flowers radiating out from the stem; this wood is used for making uprights of houses by the natives; common name: "Sa-sar-su").

BRITISH NEW GUINEA: Lower Fly River, E. bank opposite Sturt Island, *Brass 8106* (AA), a common substage tree on flood plains in rain-forest, Oct. 1936 (leaves grey underneath; flowers yellow).

Apparently the species is wide-spread throughout the Solomon Islands and is common in New Guinea, fide coll., even though only a single collection from the latter island is at hand. The pale lower surface of the blunt lanceolate leaves is a striking feature. Distinct also are the slender peduncled umbels of the δ inflorescence and the flattened globose fruit subtended by a somewhat shallow cupule which, as the fruit shrinks in drying, flattens and becomes fluted. The striate branchlets, reddish with greyish maculations, are consistent throughout. The New Guinean speci-

men has larger leaves but can in no other way be separated from those from the Solomon Islands. It is necessary to turn to species from Malaysia and from the Philippines to find any affinity to *L. solomonensis*, and even so the relationship is not close. Vegetatively the new species resembles *L. cambodiana* Lct. from Indochina, but the similarity ends there, for the latter has a racemose instead of umbellate inflorescence.

***Litsea complanata*, spec. nov.**

Arbor, ramulis minute sparseque puberulentibus teretibus, junioribus angulatis et complanatis, striatis pallide brunneo-maculosis lenticellatis atro-brunnescentibus. Folia alternata, elliptica vel oblongo-elliptica, 13–22 cm. longa, 6–11 cm. lata, chartacea, obtuse acuminata, acumine mucronulato, raro obtuse acuta, basi cuneata vel acuta, utrinque glabra, supra atro-brunnescentia, subtus pallida, penninervia, nervis 3–4(–5) plerumque alternatis, nervis et costis supra puberulis leviter elevatis subtus glabris conspicue elevatis atro-brunnescentibus angulatis arcuatis, venis transversis utrinque conspicuis, petiolis satis gracilibus 3–4 cm. longis atro-brunnescentibus glabris. Inflorescentia ♂ axillaris et caulina, numerosa, racemosa, vel racemoso-paniculata, 2–4 cm. longa, glabrescens, junior pallide pubescens, umbellata, bracteis minutis ad 1 mm. longis dense pubescentibus persistentibus glanduloso-punctatis, umbellis 4–5 apicalibus exceptis cito deciduis. Flores \pm 4, 3–4 mm. longi, extus pubescentes, pedicellis 3(–5) cm. longis gracilibus pubescentibus. Inflorescentia ♀ et fructus ignoti.

NORTHEASTERN NEW GUINEA: Morobe District, Butung R., *Clemens* 5358 (TYPE ♂, AA), alt. 870 m., Feb. 9, 1937; Sattelberg, *Clemens* 1891 (AA), alt. 1050 m., Feb. 1936; Sattelberg, *Clemens* 1061 (AA), alt. 1020–1220 m., Dec. 3, 1935.

The dark, blackish-brown, terete, striate stems, covered with paler brownish lenticels about which is a distinct patch of color, represent an unusual character. The very young branchlets appear distinctly angular and flattened, particularly at the nodes. The chartaceous leaves, darkened above and paler below, with few (3–4–5) lateral nerves, usually not all opposite, which are arcuate and more often than not angularly so, present another character. The tip of the leaf varies from obtusely acuminate to narrowed to an obtuse tip; the tip in all cases bears a persistent mucron which has grown faster than the surrounding leaf tissue, the latter often appearing to be involute about the mucron. The numerous inflorescences, usually more than one from an axil, may branch into three at the tip, but usually there is a single stalk with 4–5 persistent flowers near the apex. The rest of the flowers are very quickly deciduous after the inflorescence reaches its full length, leaving only the small pubescent bracts on the branchlets. *Clemens* 1891 has smaller leaves and more numerous inflorescences, but there seems no doubt of its being conspecific with the other numbers.

***Litsea domarensis* O. C. Schmidt in White in Jour. Arnold Arb. 10: 215. 1929.**

Inflorescentia ♀ axillaris vel caulina, fasciculata plus minusve umbellata, ad 1.3 cm. longa, breviter dense pallide ferrugineo-sericeo-pubescentis, umbellis plerumque 2–3 persistentibus, bracteis 4, pubescentibus ciliolatis. Flores \pm 6, 4.5 mm. longi, brunnescentes, argenteo-pubescentes, perianthii lobis 6, 2 mm. longis, tubo 2.5 mm. longo, pedicello 0.5 mm. longo. Infruc-

tescentia ad 2.5 cm. longa, pedunculis plerumque gracilibus subangulatis striatis leviter pubescentibus. Fructus nitidus, niger fide coll., glaber, ellipsoideus, $\pm 11 \times 9.5$ mm., fide coll., cupula incrassata, rugosa leviter pubescente ± 5 mm. longa, ± 8 mm. diam., pedicello satis crasso pubescente ad 4 mm. longo.

BRITISH NEW GUINEA: Middle Fly River, Lake Daviumbu, *Brass* 7559 (♀, AA), common in rain-forest substage, Aug. 1936 (tree 14–15 m. high); Lower Fly River: E. bank opposite Sturt Island, *Brass* 7982 (AA), common on the lower ridges in rain-forest, Oct. 1936 (spur-buttressed canopy tree 25 m. high; bark close, lenticellate; leaves grey underneath; fruit smooth, shining, black, $\pm 11 \times 9.5$ mm.). NORTH-EASTERN NEW GUINEA: Morobe District, Sattelberg, *Clemens* 1893 (AA), alt. 990 m., forest hills, Feb. 21, 1936 (tree, dbh. 15.2–21 cm.; flower buds grey-yellowish); same locality, *Clemens* 1896 (AA), alt. 750–900 m., Feb. 25, 1936; Finschafen, hospital hill, *Clemens* 79, (AA), alt. 150 m., Sept. 5, 1935 (tree 12–15 m.; branches low; buds cream; fruit green).

SOLOMON ISLANDS: Guadalcanal: Uulolo, Tutuve Mt., *Kajewski* 2578 (AA), alt. 1200 m., common in rain-forest, April 26, 1931 (small tree up to 10 m. high; well advanced flower buds on specimens covered with brown hair; common name: "Latembutu").

?NEW BRITAIN. Boava area: Waterhouse 283 (*Yale Ser. No.* 27594) (NY), July-Aug. 1934 (leaves tough; common names: "Pulotabu," "Kaviti").

The fruiting specimen *Brass* 7982 is less pubescent than the type, but there can scarcely be a doubt of its being conspecific with *L. domarensis*. *Clemens* 79 from Finschafen was collected at a lower elevation (500 ft.) than the other *Clemens* numbers. It is a ♀ specimen and shows a deviation from the type in a few minor details. Nevertheless, this seems to be the most logical disposition of it.

***Litsea mafuluensis*, spec. nov.**

Arbor gracilis 15–20 m. alta, ramulis teretibus striatis griseis, ultimis rubescentibus lenticellatis. Folia alternata, elliptica vel obovato-elliptica, (10–)16–21 cm. longa, (4.5–)7–9 cm. lata, subcoriacea, acuminata vel obtuse acuta, basi acuta, supra glabra, costa excepta, subtus breviter pallide pubescentia, penninervia, nervis 6–8 supra impressis subtus elevatis, venis transversis subparallelis, utrinque reticulata, reticulo supra quam subtus conspicuiore, petiolis ad 3.5 cm. longis rubescentibus glabrescentibus. Inflorescentia ♂ axillaris et caulina fasciculata, 2–3-umbellata, ad 2.5 cm. longa, minute pubescens, pedunculis pergracilibus ad 1.5 cm. longis. Flores 4–5, ± 3 mm. longi, flavi fide coll., in sicco extus ferrugineo-pubescentes, perianthii lobis 8, glanduloso-punctatis extus pubescentibus, pedicellis brevibus dense ferrugineo-tomentosis. Inflorescentia ♀ et fructus ignoti.

BRITISH NEW GUINEA: Central Division, Mafulu, *Brass* 5279 (TYPE ♂, AA), alt. 1250 m., common in limestone forest substage, Oct. 15, 1933 (slender tree 15–20 m. high; flowers yellow).

This species belongs in the group with *L. domarensis* Schmidt, also from New Guinea, but can be separated from it by the smaller leaves (those of *L. domarensis* are $16.5\text{--}34 \times 10\text{--}19$ cm.) with never more than ten pairs of nerves. Also close, if one can rely on the description, is *L. Engleriana* Teschner, which may be separated by the densely tomentose lower surface of leaves which have a tendency to be wider (8–20 cm.). The long and very slender peduncles of *L. mafuluensis*, topped by the bright brown (in

dried state) umbels, and the greyish branchlets, which are reddish and heavily lenticellate at the tips, cause the species to stand apart.

Beilschmiedia Nees

Beilschmiedia Archboldiana, spec. nov.

Arbor 22 m. alta, ramulis glabrescentibus obscure striatis, junioribus plus minusve papillosis, fusco-brunnescentibus. Folia alternata vel subopposita, lanceolato-elliptica, 6–11.5 cm. longa, 2–4 cm. lata, subcoriacea, acuminata, basi acuta, saepe paullo obliqua, supra nitida lepidoto-papillosa, subtus glauca, minute pubescentia, glandulosa, penninervia, nervis 10–12 supra obscuris subtus leviter elevatis, costa subtus quam supra elevatiore, utrinque laxe conspicueque reticulata, petiolis 3–9 mm. longis 1–1.5 mm. latis minute papillosis griseo-pubescentibus. Inflorescentia axillaris et subterminalis, laxe cymoso-paniculata ad 15 cm. longa, adpresse sericeo-fulvo ferrugineo-pubescentibus multiflora, pedunculis 2.5–9.5 cm. longis striatis brunneis pubescentibus mox glabrescentibus. Flores 1.7 mm. longi, gemmae flavescentes fide coll., perianthii lobis 6, 1.3 mm. longis, extus adpresse pubescentibus, glanduloso-punctatis, pedicellis ad 0.75 mm. longis. Fructus atratus, papillosus, ellipsoideus, 14–16 mm. longus, 9–11 mm. latus.

NETHERLANDS NEW GUINEA: 2 km. sw. of Bernhard Camp, on the Idenburg River, *Brass & Versteegh 13533* (TYPE, AA), alt. 650 m., occasional tree of primary rain-forest on the slope of a ridge, April 3, 1939 (tree 22 m. high, diameter 48 cm.; crown not widespread; bark 5 mm. thick, grey, fairly smooth; wood brown; flower buds yellow; fruits black).

The species is outstanding because of the glaucous and pubescent lower surface of the leaves and their loosely reticulate upper surface. The tawny-ferrugineous long pedunculate inflorescence is also a feature of note. The species falls into the same group with *B. Dielsiana* and *B. acutifolia* of Teschner from which it is separated by the reticulate rather than areolate venation. Floral differences also manifest themselves on further study.

Beilschmiedia Brassii, spec. nov.

Arbor 20 m. alta, ramulis glabris, irregulariter sulcatis cicatrisatis griseo-brunneis. Folia alternata, obovata, 7–16 cm. longa, 3.5–8 cm. lata, coriacea, rotundata vel retusa, basi plus minusve rotundata, saepe obliqua, utrinque glabra, supra nitida, pallida, rugosa fide coll., subtus minutissime lepidota interdum minute glandulosa, subinde fusco-villosa, penninervia, nervis 6–8 subtus quam supra elevatiorebus satis arcuatis, utrinque laxe reticulata, petiolis crassis 1–2 cm. longis griseo-brunneis glabris. Inflorescentia ignota. Infructescentia axillaris, subterminalis, crassa, ad 10 cm. longa, glabra, pedunculis sulcatis. Fructus flavescentibus, sectus lactescens fide coll., in sicco fuscus, papillosus, subglobosus, 15–17 mm. longus, 12–15 mm. latus, calyce deciduo reliquo subtentus, pedicello crasso 6–7 mm. longo, 3–4 mm. lato irregulariter sulcato glabro.

BRITISH NEW GUINEA: Central Division, Dieni, Ononge Road, *Brass 3930* (TYPE, AA), alt. 500 m., rain-forest, May 2, 1933 (tree 20 m., with dense crown and uneven brittle lenticellate pale brown bark; leaves pale, wrinkled, glossy above; fruit pale yellow, shining, almost globose, \pm 2 cm. diam., exuding a milky sap when cut).

This species, with leaves which are pale shining above and minutely

scurfy with intermittent glands and an occasional black hair below, is unusual indeed. The almost globose pale yellow fruit is a distinguishing feature. It is with no hesitation that I describe it as new, even though no flowers are available.

Beilschmiedea bullata, spec. nov.

Arbor ad 33 m. alta, ramulis glabris tuberculatis, junioribus plus minusve sulcatis, brunneis. Folia alternata, elliptica, obovata, 12–17 cm. longa, 6–10 cm. lata, coriacea, bullata, rotundata vel subacuta, basi acuta, utrinque glabra, junioribus costa venisque lepidoti-pubescentibus, penninervia, nervis 8–10 subtus quam supra prominentius papillosis brunneis satis arcuatis, utrinque minute alveolata, petiolis crassis 1–2.5 cm. longis 3–3.5 mm. latis, brunneis glabris papillosis. Inflorescentiae ignotae. Infructescentia axillaris, subterminalis, paniculata, ad 12 cm. longa, minute adpresse pubescens plurifructigera. Fructus atro-virens fide coll., in sicco brunneus, glaber, subpapillatus, ellipsoideus, 2–4 cm. longus, 1.2–2.5 cm. latus, calyce deciduo reliquo subtentus, pedicello crasso 5–7 mm. longo 2–4 mm. lato minute adpresse pubescente.

NETHERLANDS NEW GUINEA: 6 km. sw. of Bernhard Camp, Idenburg River, *Brass & Versteegh 12528* (AA), alt. 1250 m., common tree of primary forest on a ridge, Feb. 17, 1939 (tree 33 m. high, diameter 82 cm.; crown not widespreading; bark 13 mm. thick, black, rough; wood red; fruits dark green); 4 km. sw. of Bernhard Camp, Idenburg River, *Brass & Versteegh 13112* (TYPE, AA), alt. 850 m., frequent tree of primary rain-forest in the flat plain, March 6, 1939 (tree 29 m. high, diameter 63 cm., the crown not widespreading; bark 14 mm. thick, grey, fairly rough; wood red-brown; fruits green); ? same locality and alt., *Brass & Versteegh 13693* (AA), frequent in somewhat swampy rain-forest of river plains, March 1939 (sparsely branched tree \pm 20 m. high \times 25 cm. diameter; branches myrmecophilous; fruit black).

A species outstanding because of the bullate leaves with prominent venation beneath, the branchlets and costa on the lower surface showing a distinctly papillate condition, and the minute appressed pubescence of the entire inflorescence. There can be hardly a doubt that the smaller-leaved no. 12528 is conspecific with the lush, large-leaved, large-fruited type from a rain-forest of lower altitude. Such a distinctive vegetative character as the occurrence of bullate leaves warrants the species being set up on fruiting material alone. *Brass 13693* has leaves less bullate than those of the type, with a tendency towards bullate leaves, however, on those areas where less pressure was apparently applied while drying. The infructescence is longer (nearly 17 cm.). Also, *Brass* notes this number as being myrmecophilous, whereas in the other two numbers cited there is no mention made of such a character. There is a tendency, as well, towards larger leaves (up to 20 cm. long \times 16 cm. wide). In other respects no. 13693 is the same as the type.

(To be concluded)

